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Proceedings

of the

New York Farmers

SEASON 1897-98

PRINT
JOHN WARD
25 JOHN STREET
NEW YORK

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The "New York Farmers"

HELD their first meeting of the season of 1897–98 at the Metropolitan Club, on Tuesday, December 21, 1897, Mr. Depew occupying the chair.

In opening the proceedings, Mr. Depew said: Gentlemen—We begin a little late to-night but it is due to the fact that this is our annual meeting and that the unusual modesty of the gentlemen who were proposed for president of the club caused them to decline, one after another, which necessarily (or unnecessarily) used up half an hour of our time. It is quite an accident that I should be projected into this place, and it is wholly due to the shrinking nature of the president, Mr. Thorne, who is always modest and in the right place. I accept the position as president of the club pro tem, as a tribute to my ability as a farmer. It is known all over the country. Many years ago I ran for President, as the granger's friend.

We are a much abused organization. We are said to be Fifth Avenue farmers; and it is said that all our efforts are made in brownstone fronts and upon asphalt pavements. As a matter of fact, the gentlemen who sit around this table have, in the years that have gone by, in the meetings that have been held during those winters, and through the experts who have come here and read their papers, prepared a manual of agriculture at the close of the year which is one of the best contributions to the agricultural literature not only of this but of every country. Whenever I have gone abroad for the last twenty years, the gentlemen connected with agriculture on the other side—and there it is a vital question, because the aristocracy there is built upon agriculture, while here the aristocracy builds up agriculture—have always spoken of this club and of the value of its publications to their establishments. A few years ago I was in Dublin. A committee called upon me at the hotel and said: "The porter," (who answers to the intelligent clerk here,) "having stated that you were in the house, and the publications of your club being among our best literature, we want to know, as this is the annual meeting of the Royal Agricultural Irish Society, if you will not attend and give us the results of the latest agricultural experiments in the United States?" I took the night train for London.

Our subject here to-night is "Hardy Flowering Shrubs and Perennials." The hardy flowering shrubs we have on the table; and the perennials we have about the table. Anybody who is familiar with the history of Sam Sloan, George Haven, John Sloane, John D. Wing and the rest of them knows that those are the perennials.

We have present with us to-night experts who will develop this shrub question and also the perennial question. The professor who sits by my side says that there are one thousand shrubs and three thousand perennials, and that there is a magic lantern which, before we adjourn, will exhibit to us the peculiarities of each one of the four thousand.

I have the pleasure now of introducing to you, for the purpose of reading the first paper of the evening, Professor Maynard, of the Massachusetts Agricultural College.

Professor Maynard: Mr. President and Gentlemen of the New York Farmers—I feel greatly honored by an invitation to this dinner of the New York Farmers and to address gentlemen who have done so much for the cause of education and especially of agriculture and horticulture.

The subject for discussion this evening is one of great importance, for hardy flowering shrubs and plants play a very important part in the decoration of our homes and public places.

Trees and the lawn may be called the foundation or background of the landscape picture, and something of beauty may be produced with them alone; but shrubs and plants are to the landscape picture what the finishing touches of the artist are to the masterpiece in oils or water colors.

With them, we can tone down abrupt masses of tree foliage and trunks in such a way as to give a well rounded, graceful outline to our wooded groups; we can cover our walks and other artificial low objects in the foreground without obstructing the distant views; marking the entrance to short walks, or covering low steps or stairways leading to the dwellings or from one grade of the ground to another.

They serve as an ornamental cover for all kinds of stone work or masses of rocks, filling in among them pleasing natural covers where there is too much of one character—for rocks alone, unless of gigantic proportions, have little attractions. They are gloomy and hard in their aspect and need the graceful climbing vine, the pendant ferns, the bright flowers of our shrubs, or the life and sparkle of water to make them things of beauty.

Abrupt wooded slopes are made beautiful and sliding banks of soil or rock may be covered by them in such a way as to transform barren wastes into places of beauty.

At this point I cannot refrain from referring to the grand and beautiful Palisades along the lower Hudson river, which it was my pleasure to see this morning in a ride to Tarrytown. More grand or beautiful features are not found in the Eastern States or perhaps in any other section

of our country, and such features should not be destroyed or marred by the greed of men.

This whole section should be taken under the control of the State, and no so-called improvements or changes should be allowed except under the supervision of men who understand the great value that attaches to such natural scenery and what can be done to preserve or improve them. The preservation of the trees and shrubs is imperative if you wish to keep this grand section from going rapidly into barrenness. With a little expense in encouraging the growth of desirable shrubs, vines and plants, the work of renovating and improving will go on rapidly.

Then, too, these plants are the ideal covering of the ground in forest growths, whose greatest beauty is never realized unless under-shrubs and shade loving plants are abundant among them.

The borders of our natural or artificial sheets or streams of water do not possess the desired finish or quiet beauty unless more or less covered at intervals with plants and shrubs that grow to perfection under such conditions.

The beautiful masses of color produced by these plants are generally more delicate and beautiful than those produced by our trees or annual plants.

I suppose no country in the world possesses so great a variety of beautiful hardy perennial flowering plants as the United States. The great range of our climate gives us the gorgeous coloring of the northern flower, the luxurant growths of the tropics; and the many changing conditions of elevation and climate, from the Atlantic to the Pacific, results in a wonderful wealth of perennial growth.

But we are not dependent upon our country alone for the beautiful things we may have about our homes. American enterprise has searched almost the entire earth's surface for plants of a useful or ornamental character, and our enterprising nurserymen have propagated them until every one may have products of all countries, that will endure our climate at a very little cost.

With all this wealth of material to be had almost for the asking, we often wonder why our homes are not more beautifully surrounded; and yet when we stop to think of the comparatively few species of plants that will flourish on a given soil, we can see how discouraging it must be to the novice, in his attempts to surround himself with those beautiful trees, shrubs or plants, that are such things of beauty when growing under the most favorable conditions.

One of the first lessons, therefore, that we must learn is the nature of our soil and the plants that will best grow upon it. We can, of course, produce to a certain extent a great many conditions of soil and surroundings to accommodate the plants we desire to grow; but in our attempts in this direction we as often make failures as successes, for it

requires the greatest skill and insight into nature's laws and conditions to be successful in this work, and such work must often be done at considerable expense.

One of the great causes of failure in planting our ornamental grounds is to be found in the insufficient preparation and fertilization of the soil. If we look about us for beautiful specimens of trees, shrubs or plants in their natural condition, we find that those most perfectly developed are located where there is a wealth of food material continually supplied, and this becomes necessary when we consider that in nature every species must compete more or less with other species for existence.

Then I think we do not realize how quickly the roots of close planted trees and shrubs exhaust the soil of its food elements. We see this in the succession or natural rotation of plant growth in nature. For a term of years, more or less extended according to the kind, one plant grows luxuriantly under certain conditions, and when these conditions change they die, to have their places taken by other species adapted to the conditions they have produced.

This rotation is most strikingly illustrated by many hardy herbaceous perennials. On a light soil we may have, perhaps, an aster or solidayo that grows luxuriantly for a time, but in a few years it has exhausted the plant food or conditions of soil suited to its growth, or the conditions of soil have changed by the accumulation of decaying stems and leaves on the surface and roots in the soil—for more or less of the roots die annually as well as the tops—until the land is fitted for the growth of another species of the same, or another widely different genus.

For another example, we may take a very wet piece of ground. Here we find coarse, rapid growing plants that quickly accumulate organic matter, and in a very few years time the soil is raised to such a grade that it becomes surface drained, and upland growths supplant those originally found in the wet soil. The roots, tubers or cornus of most of our cultivated herbaceous perennials increase and spread over the limited space we allow them so rapidly that we find it necessary to dig up and replant after a term of years.

We can hardly prepare the land too thoroughly by deep working (subsoiling, where possible) and pulverizing of the soil; and even then with our close planted groups we must soon add *more* plant food and keep up a *continued supply*, if we would grow the most beautiful specimens.

This is more necessary under cultivation, even, than in the natural plantations, where the growths of leaves, flowers and fruits are allowed to fall and remain about the plants, *thus* returning a part of that food taken from the soil each year. I have never found a *better* way of "keeping up" the growth of our shrubs and herbaceous perennials than by putting a neat mound of rich manure about them at the approach of winter, removing it or spreading it about them in the spring. Where the soil is natur-

ally *retentive* of moisture and not easily affected by drouth, I have no doubt that chemical fertilizers would also give entirely satisfactory results.

We often defeat our own efforts to produce permanent results by too close planting. The grouping close together of ornamental material, while it is still small, is desirable for *immediate* effect, but unless thinnings are soon made all the specimens are weakened and we have no fine, well developed growths. This close planting and subsequent destruction seems like a waste of material, but the process is like that of thinning fruit. We often pick off from our trees three-quarters of the plums, pears or peaches and still find, at the end of the season, as large a yield, by measure, as if none had been removed, and the product is many times more valuable.

In grouping ornamental material, much more satisfactory results are to be obtained by planting *large* masses of *one* kind in a place, than in making mixed groups, *unless* the place be very small.

If a continuous border of considerable extent is to be planted, a large mass of one kind would be planted at the end, to be followed by some contrasting shrubs or plants; not putting those adjoining which flower at the same time but grouping them at a considerable distance apart, so as to produce as much variety as possible.

Pleasing results in ornamental planting are often defeated by the methods of pruning often practiced; this work frequently being done with hedge shears, which results in the development, with every pruning, of numerous shoots at the ends, until they become so crowded that no flowers are produced, or, *at most*, only small and weak ones.

The flowering of shrubs is largely influenced by the time of pruning.

Those that bloom early in the spring, from buds fully developed the previous fall, should be pruned as soon as the flowers have faded; while those that produce flowers upon the new growth must be pruned *before* growth begins.

Some shrubs produce an abundance of flowers when making a strong growth, while others bloom freely while the wood growth is small; and this fact should be borne in mind when we do our pruning.

The size of the flowers, too, may be influenced by pruning. With plants like the hydrangia, the rose, etc., the *fewer* strong buds we allow to grow on a plant the *larger* will be the flowers.

In pruning shrubs, I would reach into the centre and remove the older and weaker shoots that are being more or less smothered by the stronger ones, *at the same time* heading in or removing here and there some of those that may be outgrowing their neighbors, so as to give the plant a graceful, well-rounded outline. It is surprising what perfection of growth and natural *beauty of form* may be produced by a little attention at the proper time.

Another difficulty we have to contend with is the attack of insects,

although this group of ornamentals are not so much injured by these pests as are the trees.

Among the most destructive of these pests are the *rose chaffer*, *rose slug*, *leaf hopper*, *leaf miners*, *scale insects* and *aphides* or plant lice.

Remedies—For all chewing insects like the rose chaffer and larvæ of beetles, moths, butterflies, etc., Paris Green has become the most used and effectual remedy.

It may be applied with little or no injury at the rate of one pound to two hundred gallons of water. For plants with very delicate foliage, like the flowering peach, etc., the addition of a pail full of rather thick lime wash to fifty gallons of the solution will prevent injury. Dry Paris Green applied with bellows or powder guns is often used, but its use in water is much safer. On roses it may be used until the flower buds are nearly formed, after which there would be considerable danger from inhaling the poison, and the rose bugs or chaffers may be kept from injuring the blossoms by dusting lightly with pyrethum powder once or twice each day. Powdered hellebore is also used, to some extent, to destroy chewing insects, and is less dangerous but not quite so effectual as Paris Green.

Sucking insects, like scales, aphides, leaf hoppers, etc., etc., are destroyed by the use of kerosene emulsion and solutions of whale oil soap.

The standard formula for kerosene emulsion is one-half pound of common hard soap dissolved in hot water. While this is still hot, add two gallons of common kerosene and churn with the garden syringe or hand pump until a thick creamy substance is produced. The emulsion will be more perfect if the dissolved soap is kept on the stove and near the boiling point while the churning is going on. In using, dilute, for winter application, to from five to ten gallons, and for summer use to fifteen or twenty gallons.

For scale insects, application should be made when the young scales have just hatched out, which, with most species, occurs in May or June.

Whale oil soap is used for the destruction of scale insects in winter at the rate of one pound dissolved in from two to three gallons of water, and for summer application, one pound to five or ten gallons.

Some of this group of plants are injured by such fungous diseases as rusts, mildew, blights, etc.; but not with serious results, except in a few cases. The remedy for most fungous growths is found in some form of *copper solution*, but much may be done to prevent injury by keeping up a vigorous and healthful growth, through the proper care and fertilization of the soil.

I have briefly reviewed some of the important points relating to the use and care of hardy flowering shrubs and plants, and, if I have not exhausted your patience, will mention some of the most desirable varieties for general cultivation.

Among the shrubs of decided merit, and that will succeed under the greatest variety of conditions, may be mentioned the following:

Azaleas. (Now botanically known as Rhodendrons.) Mostly shade-loving plants, that thrive best in a deep porous soil. Among the best species are the Ghent Japanese or A. Molis and the native species A. Nudiflora, Vaseyu and Calendulacea.

Barberry. Berbesis Vulgaris, B. Purpura, B. Thurberger, B. Siebaldi.

Sweet Spice Bush. Clethra Aluifolia.

Cornels. Cornus Florida, C. Alteruifolia, C. Pamculata, C. Siberica.

Hazels. Corylus Avellana Purpurea.

Japem Quince. Cydonia Japonica, scarlet, pink and white varieties.

Exochordia. Exochordia Grandifolia.

Golden Bells. Forsythia Suspensa, F. Fortuni, the first being especially valuable because of its pendant drooping habit.

Hydrangea. Hydrangia Paricculata, Hydrangia Paricculata Grandiflora.

Honeysuckles. Ionicera Lastarica, L. Japonica.

Mock Orange. Philadelphus Coronarius, Philadelphus Coronarius Aureus, Philadelphus Grandiflora.

White Funge. Chionanthus Virginicus.

Purple Funge. Rhus Cotinus.

Sumac. Rhus Glabra, R. Osbeskei, Rhus Vernicifera.

Spiræas. Spiræa Brunalda, S. Callosa, Spiræa Thurbergi, S. Van Houttii, Spiræa Anthony Waterer.

Snowballs. Vibernum Opulus (*Mountain Cranberry*), Viburnum Opulus, Var. Sterilis, Viburnum Plicatum (Japanese).

Lilacs. Syringa Vulgaris, L. Persica, of which there are a large number of newer sorts, that are great improvements on the old kinds.

Roses. In addition to the groups of hardy perennial summer roses and other groups now so generally grown, there has recently been introduced many choice hybrids of the multiflora and rugosa crosses that are especially valuable.

EVERGREEN SHRUBS.

This group is especially valuable on account of its winter effect, but must be planted in sheltered places or be protected from the burning sun during the winter. Among the best of these are the *Rhododendrons, Kalmias, Audromedas, Box and Holly.*

CLIMBING VINES.

No grounds with any attempt at naturalness can dispense with climbing vines to cover rocks, arbors or barren slopes.

Among the best are:

Woodbine. Ampelopsis Quinquefolia, Ampelopsis Vistalin.

Dutchman's Pipe. Aristolochia Sipho.

Bitter Sweet. Celastrus Scandius.

Clematis. Clematis Virginiana, C. Coccinea, C. Paniculata.

Trumpet Creeper. Fecoma Radicans.
Wistaria. Wistaria Sinensis.

HARDY HERBACEOUS PLANTS.

Japan Plume Grass. Eulalia Japonica, Eulalia Japonica Zebrisa, Eulalia Japonica Gracillema, Eulalia Japonica Variegata.
Double Sunflower. Helianthus Multiflora.
Hollyhock. Althea Rosea.
Japan Iris. Iris Koempherii.
Lilies, Peonies, Poppies, Phloxes, Pyrethun, Bloodroot, Asters, Solidagoes, Yuccas, Ferns, Dutch Bulbs, etc., etc.

Mr. Depew: We are greatly misunderstood here as a philanthropic body. Most of the gentlemen around this table are constantly abused in the public press as monopolists, millionaires, multi-millionaires and all that sort of thing; and it is not understood that the money which we make or have made in oil or journalism or railroads or what-not is really all expended in experiments in agriculture, and that, while it costs us an enormous amount of money, the ultimate results of our experiments are felt by the vast community of this country, which lives upon agriculture and feeds the rest in the world. So that every man about this table is really an expensive experimental station all by himself.

I now have the pleasure of introducing Dr. N. L. Britton, who was formerly Professer of Botany, of Columbia, but who has graduated from that to the higher position, in its way, of Director of the Botanical Gardens which we are about to establish on the Bronx.

Dr. N. L. Britton, Director of the New York Botanical Garden, spoke as follows:

Gentlemen—My first impression on being so cordially invited by your President to speak to you to-night, was something in the nature of the first expression of Mr. Maynard in speaking on this subject when he spoke of the wealth of material with which we had to deal—that it was so great as to be difficult to make a selection. And so it is. The statement which the chairman made, of there being a thousand different kinds of shrubs and some four thousand different perennial herbs, which may be brought into cultivation for one purpose or other, is not at all an exaggeration. But the statement that we propose to show you all of these through the lantern to-night is, perhaps, a little more than we can attempt. Through the kindness of my friend, Mr. Van Brunt, I have the pleasure of showing you a series of colored photographs, colored lantern slides, which will supplement, to a certain extent, the remarks made by the preceding speaker. We shall show you these in the sequence of their appearance, beginning with the earliest flowering shrubs and plants generally, and working along through the seasons into the autumn. They were selected purposely, with the idea of displaying those that are perhaps more ornamental. I was also asked to say some-

thing relative to our use of these plants at the botanical gardens. I may say here that we propose to use them in what we might term three different ways. In the first place, we propose to use them horticulturally—that is, from the decorative side—over a very great proportion of the grounds. Secondly, we propose to group them botanically, bringing the different families and different kinds together in carefully prepared and outlined plots, giving about twenty acres to the shrubs and about nine acres to the herbs. Thirdly, to group them in a very much more limited way, to illustrate the economic uses of those plants to the arts and sciences, in what we may term the economic garden. We have made a start during the past year towards getting the material together to effect these ends. We have brought together now about one thousand different kinds of perennial herbs and shrubs, largely in the nurseries but partially in plots. Out of the two thousand eight hundred different kinds of plants that we succeeded in getting together this year, I should say just about one thousand of them fall within the category we are engaged in considering to-night. In showing you these I do not know which you will most admire—the recalling to your minds the appearance of these plants, many of which will be quite familiar to you, or the extreme accuracy of the photographs and the coloration of the leaves and flowers, which has been brought about by Mr. Van Brunt. Of course I do not know in all cases the exact plant from which the photograph was taken, but Mr. Van Brunt will be able to tell you that. There are a considerable number that have been photographed from the plants we already have at Bronx Park.

Dr. Britton then spoke on the hardy flowering shrubs and perennials, which were the subjects of the rare stereopticon exhibition with which the audience was next entertained. He called attention to the great variety of species now available for decorative purposes, although comparatively few have as yet attained any extensive use. Emphasis was laid upon the availability of the native species, and on the flora of Japan, from which we have already obtained several hundred plants of great interest. The similarity of the climate of Japan and other parts of eastern Asia to our own climate, accounts for the adaptability of Japanese plants to cultivation in eastern North America. Reference was also made to the more important species supplied from Europe and other parts of the world. He illustrated by means of colored lantern slides, prepared by Mr. Cornelius Van Brunt, about one hundred kinds of shrubs and perennial herbs, taking them in the sequence of their flowering, beginning with the willows, alders, redbud, Forsythias and Japan quince, of early spring; the honeysuckles, low cherries, lilacs, syringas, columbines, pæonies, pinks, of later spring and early summer; followed by the deutzias, irises, viburnums, kalmia, roses, spiræas, lilies, hollyhocks, hawthorns and privets; and ending with the milkweeds, cone-flowers, cardinal flowers, asters and golden rods of late summer and autumn.

The pictures thus presented showed an enlargement from the life size to a figure from three to four feet in diameter. They were brilliantly colored, in close imitation of nature, and, under the advantage of the concentrated lights, presented pictures of great beauty. The fidelity to nature reflected great credit upon the artistic skill and taste of Mrs. Van Brunt, to whom the drawings and coloring were due.

Mr. Depew—Before we part this evening, it is proper to remind the members that during the past year two of our number have died, Mr. Charles A. Dana and Mr. Theodore A. Havemeyer. During the last ten or twelve years we have had no more constant attendant and no more valuable contributor to our discussions than that eminent journalist, Mr. Dana; and we have had no man who has done more for the welfare of the club than Mr. Theodore A. Havemeyer. The experiments which he made upon his large place, and his intelligence upon the questions which were under discussion, were so great, that I do not think any member of the club during its whole existence has done so much as Mr. Theodore Havemeyer to promote the object for which it was organized, and I suggest that it might be proper for the Secretary to prepare and transmit proper resolutions to the families of these two former members.

Mr. Samuel Sloan thereupon moved that the Secretary prepare a suitable minute, as suggested by the Chairman, and forward it to the families of each of the deceased members, which was duly seconded and carried unanimously.

After a vote of thanks to the gentlemen who had entertained the club this evening, the Farmers adjourned to meet on Tuesday, January 18, 1898.

The "New York Farmers"

HELD their second meeting of the season of 1897–98 at the Club House of the Metropolitan Club, on Tuesday, January 18, 1898, the President, Mr. Daniel F. Appleton, in the chair.

In opening the proceedings, Mr. Appleton said: My Friends and Fellow Farmers—This is the first opportunity I have had to thank you for the great honor you have done me in electing me to be your President. I shall be fortunate, indeed, if I succeed in performing the duties of the office at all to your satisfaction, after the accomplished and distinguished gentlemen who have heretofore filled the chair, and filled it so well and so faithfully. In naming them I begin with the founder of the Farmers, Mr. Burden, who is happily present to-night to receive your congratulations upon the progress we have made in the work which he so wisely began; then Col. Cannon, indefatigable and enthusiastic in your service, who, it is much to be regretted, is unable to be with us to-night; next. Mr. Jay, to whom, while living, we were all so much attached and whose memory we now delight to honor; and Mr. Rives, who was always diligent in providing for our instruction and entertainment, and able and eloquent as a presiding officer; and last, my immediate predecessor, Mr. Bronson, whose painstaking labors, always effective and successful, deserve your highest thanks. He could have retained the office longer if he had not persisted in declining a re-election.

Mr. Herbert W. Collingwood, upon being introduced by the President, spoke as follows:

I love the hen!

I am glad to make a public acknowledgment of that fact. I think it is generally admitted that, in order to win a horse race, a man must be a half horse—a good dairyman must certainly be half cow—a first-class shepherd is likely to possess a mutton head—a hogman will naturally find hairs in his beard of more than ordinary strength. In this view of the case, we poultry fellows have the best of it, for we can feel the wings sprouting on our shoulders. A bit of doggerel occurs to me which may, possibly, appeal to those of you who have given some part

of your personality to a member of the underfoot or four-footed world:

"There's lots of folks that love a horse
About as well as they know how.
We ain't all built alike—of course;
There's them that do just love a cow
Above their wives. Some folks will sleep
When cows or horses have the talk;
But start a word edgeways on sheep,
And see the way their tongues will walk.
And some folks sit up half the night
To sing the virtues of the hog;
And I know folks uncommon bright
Who rub their love thick on a dog.
I have, as now I must rejoice,
No quarrel with my fellow men—
But of all animals my choice
Forever is the laying hen.
She ain't so big or yet so stout
As hog, or horse, or sheep, or cow,
And yet she knows what she's about.
She pays her bill—that suits me, now.
So let them brag up all their stock
And satisfy themselves; but, then,
My mind is made up like a rock—
You can't fool *me*, I love the hen!"

Mrs. American Hen is, after all, no unimportant personage. When I was a boy I was told that, if an elephant could only have muscles as hard as those of the flea, he could easily move the world, if a place could be found for securely fastening his tail. I have never doubted it. It is one of the things that cannot be proved. I cannot see how the elephant's muscles are to be hardened by crossing him with the flea, however; so doubting is safe. I know now that, if the elephant could be made to produce proportionately as much food as the hen, hunger and starvation would be unknown. Our standard for the measurement of power is the work of the horse. That is wrong. It is like going on a silver basis. Hen power is the true standard. Compare the work of production done by 1000 lbs. of horse, 1000 lbs. of cow, 1000 lbs. of average man and 1000 lbs. of hen, and you will be astonished to see what a loafer the horse is by comparison.

I wish to call attention to the fact that there are in this country to-day, in round numbers, 375,000,000 chickens and 40,000,000 other fowls, such as ducks, geese and turkeys. During 1897, the hens laid 14,400,000,000 eggs. The export price at New York City averaged 15c. a dozen, which makes the value of the egg crop $165,000,000. Poultry sold as meat, as broilers, boilers and bakers, brought $125,000,000 more; making the total hen crop, at a very conservative rate, $290,000,000. You gentlemen are accustomed to deal with values that are concentrated, brought

together into immense blocks, so that the value is at once noticeable. This great value of the hen crop is scattered broadcast. We deal with it chiefly from the individual side, and it is astonishing to realize how much it is in the aggregate. In order that these figures may be appreciated, I will call your attention to a few statistics:

Earnings of poultry	$290,000,000 00
Total of pensions	139,280,078 15
Total of school expenditures	178,215,556 00
Total interest of mortgages	76,728,077 00
Value of swine	186,529,745 00
Value of potato crop	78,984,901 00
Value of tobacco crop	35,574,220 00
Value of cotton crop	259,164,640 00
Value of oat crop	163,655,068 00
Value of wheat crop	237,938,998 00
Salaries of all school teachers	116,377,778 00
Value of all church property	679,630,139 00
Total military expenses	52,947,075 00
Value of all minerals	218,168,788 00
Value of hogs	186,529,745 00
Value of gold	46,610,000 00
Value of silver	72,510,000 00
Value of wool	38,146,559 00
Value of sheep	68,167,725 00
Value of milch cows	263,955,545 00

In one year the hens of the country will pay the net bonded debt of Greater New York and have enough left to buy all the gold and the silver mined during the year—that is, if they could borrow $10,000,000 from the ducks and geese. One year's earnings will buy all the minerals produced in a single year, and will pay, in addition, every cent of the interest on farm mortgages. The American hired man, taken as an individual, is a person of small consequence. He is usually neither dignified nor desirable; yet the 3,454,675 farm laborers in the country earned last year in cash, board not included, $362,740,665. The fact is that the hens and the hired men, taken together, in two years' earnings would buy all the church property and have enough left to pay all pensions and all our public school teachers. The same sum would pay operating expenses for all American railroads for one year and also pay the wages of all the clothing makers, all the iron workers, all the cotton mill hands and all the carpenters in the land. One bushel of wheat costing ninety cents will feed a hen for 300 days. If she lays 100 eggs, worth two cents each, she will increase the value of the wheat to $2.00, which is enough to haul one ton of freight 250 miles or to haul one passenger eighty miles. After she has done all

this, she will return twenty-five cents worth of the fertilizing value of the wheat to the soil for another crop.

Now a word about the egg itself. It is the handiest form of food for working people. During the season of cheap eggs you will be astonished to see how many workmen in the city eat fried egg sandwiches for their dinner. If you would go among them during the dinner hour you would see them everywhere eating this cheap and excellent substitute for meat. I call attention to this to show that Mrs. American Hen is doing her full share to contribute the nerve force and the strength that human hands employ in building your great and magnificent city. In Greater New York, including Jersey City, Newark, and Elizabeth, there are 4,029,577 persons. If we could get these people to average two eggs per day for one year, we should need 2,941,547,410 eggs, which, placed end to end, would make a string 111,422 miles long and would pave a street 60 feet wide for more than 1,500 miles and would require a building 150 feet square and 155 high to hold them all. I have in these six small bottles the different parts of an average egg, picked apart by the chemist so that we may compare them. Here are 650 grains of water, 135 grains of oil or fat, 108 grains of lime, 80 grains of albumen, 26 grains of sugar and 10 grains of ash. Take, for example, this small bottle of water, which represents the moisture in one single egg. I would like you to realize what that means. The hens of America last year packed inside the shells of their eggs, in round numbers, 650 tons of water. This is enough to fill a canal one mile long, 20 feet deep and 300 feet wide. The shells required to hold this water contained 110,000 tons of lime. An acre of corn requires about 300 tons of water during the growing season to produce a full crop. I will call your attention to the fact that the hens of the country last year put enough water into their eggs to irrigate over 2,000 acres of corn. This little bottle contains 26 grains of sugar—but a fraction of a teaspoonful. In the 14,400,000,000 eggs laid last year, there were, on this basis, over 50,000,000 lbs. of sugar. I mention these facts that we may realize the wonderful work performed by our little friend in feathers. Sometimes, when we touch only the one corner of a great enterprise, we do not realize how large it is.

Now, figures do not lie, although they will lie heavy on a fellow's pocketbook when they go wrong. Comparatively few Americans ever become millionaires in fact. It is, however, a glorious privilege afforded most of us that we may be millionaires in theory. My grandfather owned a whale oil factory at Plymouth, Mass. I am told that 75 years ago he made some remarkable figures. He said that in the year 1900 there would be 75,000,000 people in this country; that whale oil would be worth $16 a pound because it would be the chief lighting fluid and that every one of his grandchildren would be a millionaire. Now we have the population that the old gentleman

prophesied, but the whale ships are rotting at the wharf in New Bedford, and I lack nearly $999,000 of being a millionaire. The figures were right in their day, but the old gentleman could not know that some day a prospector would bore a hole into the ground and start the world into a blaze of light with petroleum. The world is happier and brighter because I am not a millionaire from the profits in whale oil. I am happier because I have the great privilege of figuring out a profit in the chicken business. What I want to say is that while figures may go wrong in some lines of business, it is always safe to figure on chickens. There can be no ghost of a substitute to rise up and call us down. We may have lime in our flour, lard in our butter, peanut shells in our coffee, sawdust in our tea, basswood in our hams and sand in our sugar, but the eggs cannot be successfully counterfeited. Our little friend, the hen, with her marvellous inside fixtures, will still continue at the old stand, putting her humble grist together and shelling out this most miraculous of animal products, the egg. And now let me say a word about the life that is inside this egg, for the egg takes inert and dead matter and gives it life and vigor and force. A broiler is expected to die young, like most of the good things that are pushed along to an early grave. He has no hope of posterity, for he never gets beyond his baby qualities. His father is a mere incident; he must look to his mother for the qualities that are to make him fit for the table of a prince. I think you will agree with me, gentlemen, that this idea of the preponderating influence of the mother's side holds true of both the lower and higher animals. Few people can give the first name of Abraham Lincoln's father, but his mother has even had a race horse named after her. George Washington's mother has been idealized, but his father will go down to history only as the man who had failed to do his duty by his son when he ruined a valuable cherry tree. If you will pardon me for a bit of personality, I will say that at the battle of Bunker Hill, the British sloop of war, Lively, sailed up the Mystic River and made things lively for the Americans. On board that ship, wearing a red coat and serving King George to the best of his ability, was Lord Cuthbert Collingwood, who had the honor of being my ancestor! At the same time, upon the hill beyond the breastworks, was a man without any coat at all, an old farmer, who was my mother's grandfather. The old fellow fired away the last grain of powder in his horn and then he clubbed the old gun and gave two or three of King George's soldiers a headache that they long remembered. But what I want to say is that through my father's side fate has given me the name of the red coat. It is an honored name and I am proud of it, but fate has been kinder still, and has given me, through my mother's side, from the old farmer of Bunker Hill, his sturdy Americanism, love of independence, and pride that prompts me to stand on my feet and say, "I am one of those who keep step with the privates who walk in the

common ranks of life." I am very glad that the conditions were not reversed and that my legacy from the red coat did not come to me through my mother. My point is that in the production of eggs for broilers, we must pay extra attention to the hen. The chief quality wanted in the male is vigor and strength. The broiler and its digestive organs must be sound or it will not stand the strain. My experience has been that many so-called pure breeds have been bred to feather and fine points, to the injury of heart, lung and gizzard. Where a fowl is expected to make a slow and steady growth to maturity, we may gradually improve its constitution as we go on and feed away some of the defects of its breeding. As a rule, children who take prizes at baby shows would be most likely to win leather medals for vigor and beauty at the age of 21. The feeding and forcing of the broiler is abnormal at the best, and it must have vigor or it will break down. For my part I would rather have some tough, old scrub, frost bitten and scarred, to fertilize eggs for broilers, rather than some petted, pure blood with better tail and feathers than lungs and with hardly enough energy to crow when his wife lays an egg. I should expect my chicks in that case to inherit from the old veteran a little of the vigor that had carried him through wind and rain and hunger to the championship of the barnyard. Whenever, in the history of our country, men have been needed to absorb in a few short months the remedy for the mistakes of long years of bad legislation, I observe that He who rules the destinies of this country does not go to the sunny isles of balm to find a man for the hour, but rather to the frost and the fog of the North, where human character has been hardened and tempered by rubbing against troubles and the hard conditions of life. I am satisfied that too many chicks inherit from their pampered fathers only the disposition to lie down and die when forçed with a supply of rich food.

And this egg is something more. It is the great storehouse for hereditary forces. These forces may pull together like a well-bred yoke of cattle, or they may pull apart like a cat and a dog tied together. You could hardly hope to overcome these forces unless you start back at the egg. For example, last fall I bought, in the ordinary live-poultry market in New York, 60 hens, picking them out by their general shape and appearance. I assume that there is a certain egg type or shape of hen most likely to be associated with egg production. We look for certain types in all animals when we wish to perform certain kinds of work. If I wanted to hire a man to milk the ordinary Jersey cow, I would not want a man with long legs; if I wanted a hired man who would not be given to back talk, I should certainly avoid one possessed of a chin like Corbett's. I would not hitch Maud S. to a stone wagon or expect to beat her on the race-track with horses that hauled two tons over level road. These hens that I speak of were selected because they apparently conformed to what is known as the "egg" type or shape. I do not even

know where the hens came from. We have fed them with the greatest care, yet during the month of December the few eggs they laid cost us $0.37 each. That is certainly a case where chicks or rather their evil tendencies come back to roost upon one's pocketbook. We assume that scientific feeding cannot overcome the tendency of unscientific breeding, after the hen has matured; in other words, a trait is stronger than a type. There may be hope for the baby but little for the old hen. The mothers and grandmothers of those hens were not bred for egg production. This flock is pulled every which way by hereditary forces that prompt them to take revenge upon me for the wrongs done their ancestors.

Another curious thing that we find about this flock is the fact that there are hereditary tendencies for certain foods. Many of these hens have evidently been fed entirely upon corn. They eat meat and other grains largely under protest. Hens are much like men in this respect. An ex-Mayor of New York told me not long since that he cannot get through the week without at least one square meal of corned beef and cabbage. Possibly there are persons who can tell in what country that tendency was formed. A genuine Yankee cannot forget the baked beans and fish balls of his early life. Let me feed a hen for the first three months of her life, and I will largely fix her feeding habits and also have something to do with the food her children crave.

I think most poultrymen have changed their methods of feeding since the truth became generally known that meat in some form gives by far the best material for a hen's muscle makers. Some of us who are millionaires in theory have been taught severe lessons in economy during the past few years. I know a man who, in 1890, did not think it possible for his family to live on anything cheaper than porterhouse roast beef. Economy has forced him to realize the value in a pot roast or even a shin bone. It has been a profitable surprise to such men to realize that the nerve and force in a pot roast will enable them to retain their standing in church and state. In like manner we have been forced to hunt cheaper rations for our hens, and we have found them in various forms of meat. The introduction of the green-bone cutter has really started a new industry and has doubled the cost of bones in many local markets. There was a time when the faithful old horse, at death, was hauled off to the swamp. Now his meat may be cut and ground and dried into an excellent food for the hens. The chicken business follows manufacturing and other branches in the fact that advance is made along two lines. We must improve the engine so that it will secure more power from a given amount of fuel, and we must utilize what was formerly considered waste. I am told that 27 years ago it was necessary, with the very best steam engines then in use, to evaporate 21 pounds of water in order to produce one-horse power. To-day, modern engines do the same work with 11 pounds of water. So with poultry—I am satisfied that it is possible, by careful selection and breeding, and yet more careful

feeding, to double the number of eggs which the average hen will lay, or to double the weight of broilers that may be hatched from her eggs. We must keep up the vigor and strength of our poultry and take cheap sources of meat for their food.

A hen is worthy of the best work of the fancier, the farmer or the business man. The money obtained for her products is widely distributed. It circulates everywhere; it cannot be cornered; it goes into every home, every farm, every town, every grocery store in the land. The hen is a chemist, a banker and a manufacturer. She holds the fort from the Klondike to Cape Horn, and she is rolling mortgages away upon her eggs and cackling a brave defiance when the wolf howls at the door. For my part I end as I began. "*I love the hen!*" And I give you this bit of sentiment to go with her egg:

"The fierce old eagle on the flag has had her praises sung
By poets and by orators, since this fair land was young.
A wicked, hard, old fighter he, but in our peaceful day,
A weary old back-number is the selfish bird of prey.
Old Uncle Sam, from war's alarms, may now take long release,
Beneath his vine he now has time to ply the arts of peace.
Your Uncle needs no fighting bird out in his peaceful pen,
Far better let the eagle go and raise the *Business Hen.*
The eagle and the old war flags, with faded stripes and stars,
May better serve as memories of battle-painted scars.
Aye! Let them serve as memories—a heritage of fame
That generations yet unborn may in all justice claim.
But, in these piping times of peace, the eagle off his perch
May wisely step; and when with care, old Uncle Sam shall search,
A substitute; I nominate our friend, The Business Hen,
A worthy type of energy and skill for all true men.
Down with the eagle from the flag, down with his motto slay!
Up, lively, with the Business Hen and make that motto lay!
Far better is the cackle when an honest egg is born
Than that wild eagle's screaming when a human heart is torn.
Yes, give the hen a roosting place above the starry flag.
The Business Hen! Long may she wave! The country's pride and brag,
And bred to patriotism, from her healthy eggs we'll hatch
The spunk to keep our Yankee land still toeing at the scratch."

The President then introduced Mr. E. O. Roessle, who said:

Mr. President and Gentlemen Farmers—It gives me great pleasure to be here this evening to attend the dinner of so famous a body of agriculturists as the "New York Farmers."

You may all be interested in the many different branches of agricultural pursuits and stock raising, but I shall try to interest you in the branch which is at present having the greatest boom, namely: poultry culture.

We must look back a little to the old days when setting a hen was the easiest thing in the world to do, requiring simply any old box stuck in a quiet corner, a broody hen and a setting of eggs. After this one

grand effort—and in those days it was an effort, for the farmer would talk all day about "having set a hen"—no more attention was paid to Mistress Biddy until she came off with her brood. She was left to hunt her own feed and water and in every way care for herself. When the chicks were hatched the farmer's wife would then take an interest and throw them, perhaps once a day, perhaps twice, a handful or so of corn meal mush. If it fell in the filth and dirt, it mattered little; the chicks got what they could and the hen took the rest.

The result of this primitive process of feeding and raising chickens was the survival of the fittest. But primitive though it may have been, it has laid the foundation for many sound teachings in modern poultry culture. It has proved one thing beyond a doubt, and that is that newly hatched chicks are not delicate because of their age and size, but on the contrary are quite strong and hardy; and it is only a lack of knowledge of this fact which causes the inexperienced amateur of to-day to coddle them, so that their lives are prematurely shortened and few grow up to become fowls.

The old careless method of hatching and raising chickens was pursued until the modern incubator was invented. When these machines first made their appearance, about eighteen or twenty years ago—although there were many efforts made to hatch chickens artificially long before this, and even back in old Egyptian times artificial hatching was practiced,—the idea was so crude and the machines so badly constructed that success was almost impossible. Still persistent men struggled on until a machine was perfected which would hatch a fair percentage of the fertile eggs. To-day artificial incubation is an established fact, and through its influence the method of hatching and raising chickens has been revolutionized.

Those who still stick to the old method of setting hens, and there are many thousands who do, have learned valuable lessons from the incubator. First: They have learned to choose eggs of uniform size and of perfect shape, with sound shells. As incubator chickens do not have lice, they have learned, secondly, to dust thoroughly their hens before setting, and two or three times during the period of incubation. Thirdly: They have learned to use clean nest boxes and clean bedding. They confine the hens to coops and take great pains to place proper food and water before them. Fourthly: Many test the eggs under hens, following the example of the machine men, and after testing three settings, for example, and throwing out the infertile eggs, place the live eggs under the two hens and reset the third, thus gaining time and compelling "Biddy" to do her full share of the work.

There are many incubators now in the market; some are good and some are very bad. There are a few first-class machines. Whether heating by hot air or hot water is the better I am not prepared to say; both methods have their advocates. Personally, I prefer the hot air

Prairie State machine. Any well made, first-class machine will hatch eggs—how many depends on the operator. Hatching chickens artificially is not child's play, nor is it as simple as the many attractive advertisements circulated by the inventors would lead us to suppose. Manufacturers of first-class incubators put on the market a perfectly reliable machine which will hatch a large percentage of the fertile eggs placed in it, but they cannot supply brains, and above all common sense, for each purchaser.

An incubator will not run well in a drawing-room or in a shed built above ground. The conditions of the room in which it is placed must first be studied, to determine whether a uniform temperature can be maintained. No machine has ever yet been invented, or probably ever will be, which is not affected by outside temperature. I mean by this that if the thermometer in your room or shed is seventy-two degrees at noon and fifty degrees at night, the machine's temperature will necessarily fluctuate, and it will be almost impossible to maintain the desired degree of heat inside the machine. A cellar, therefore, built underground, which can be kept comparatively dry, is the very best place in which to set up an incubator. Here an even temperature can be maintained day and night, and the machine will not vary more than one degree in twenty-four hours.

After placing the machine, the next step is filling and lighting the lamps. It is good policy to run the incubator at least twenty-four hours, heated and empty, in order to determine whether the operator is able to maintain an even temperature. This will be found much more economical than spoiling the eggs at the start. After the operator is convinced that he can control the heat, he may next introduce his eggs. There should always be eggs of one variety in the same machine. For example, White Leghorn eggs and Plymouth Rock eggs do not do well in the same machine, for the reason that the former are very thin shelled and hence sensitive to heat and moisture, while the latter, being thick shelled, are affected more slowly. This point is not always understood by the beginner, and is well illustrated by the development of the air cell, which, in Leghorn eggs, is visible to the eye in the tester at about the third day, while in Plymouth Rocks usually the sixth.

It is best to introduce the eggs when the thermometer in the machine is held at 100°. The reason for this is as follows: the bulb of the thermometer lies flat in the tray, which is a certain distance from the hot-air reservoir, which is always at the top of the egg chamber. When the eggs are introduced they, being above and an inch higher toward the heat, become necessarily hotter than the tray itself; hence when they are thoroughly heated and the bulb placed on top and touching the eggs, as it should be, the thermometer will register about 102°, which is right for the first week. This is a very important point in starting, and is not thoroughly explained in the book of instructions. If the

empty machine registers 103° the eggs will reach 105°, which will be apt to destroy the delicate germ at the start.

The next step is testing the eggs. This is a simple operation. The trays of eggs, one at a time, are taken out of the machine and placed on a table, care being taken to shut the door of the machine at once. Then pass each egg before the testing lamp, and if a dark spot with spider-like legs is visible, that egg is placed back on the tray, as it contains a chicken. The darker and stronger looking the spot appears, the stronger will be the chicken. Eggs that are perfectly clear are dead eggs, and should be thrown out; they will never hatch. When all the eggs have been tested and the machine contains nothing but live eggs, the regulator will probably have to be readjusted, because the eggs are themselves now throwing out an extra amount of heat and will continue to do this more and more as the chick develops, until pipping time.

From the first testing day until the eighteenth the eggs should be aired once a day. This is done by taking out the trays of eggs and placing them on top of the machine. The doors of the machine must be kept closed in order to retain the correct temperature during cooling. The length of time for cooling depends upon the age of the germ. At first ten minutes will be found sufficient, and this can be lengthened each day a little, to be determined by the thermometer on the tray, which should never be allowed to drop below 80°. After the eggs are returned to the machine they will regain, in a reasonable time, their accustomed 103°.

I have said nothing about moisture because I do not consider it of any great consequence. Moisture has been the stumbling block of most amateurs. It has ruined more hatches than any other one thing connected with artificial incubation. The degree of moisture in the egg is best determined by the appearance of the air cell. This forms a very small space in the top of the egg at the fifth day, enlarges until at the eighteenth or nineteenth day it spreads and takes up about one-fifth of the entire egg. The development of this air-space is the guide for moisture. If it develops too rapidly (and its proper development can be seen in the diagrams in the book of instructions), then give the machine and eggs more moisture, closing the air-slides, or perhaps placing a little hot water in the pans, thus checking it. If it develops too slowly, which is more generally the case, then open the slides and give the eggs more air. Air increases the development and moisture checks it.

This development of the air cell is a very important consideration, in fact the most important, in my opinion, in artifical hatching. Unless this cell is well developed by hatching time the chick cannot turn itself, hence dies in the shell.

All eggs should be turned twice a day, morning and night, beginning at the second day and turning last the night of the eighteenth day.

Then the machine should be left closed and not opened again until all the chicks are hatched.

I have given as briefly as I could a description of artificial incubation. It must be remembered that it is all based on nature and that Mother Hen has been taken as the teacher.

Many questions about artificial hatching have been asked, which, to the expert operator, have seemed absurd. For example: Does the hen actually turn her eggs? I can answer from personal observation that she not only turns her eggs but shifts their position, placing those outside of the circle immediately under her and those under her, outside. Does she cool her eggs? She does from about the third day and longer each day, depending on the weather and condition of the atmosphere. I have known hens in summer to stay off their nests more than an hour and yet hatch out strong chicks and plenty of them. I believe she is driven off her nest by the excessive heat under her, and this is the instinct which prompts her to leave them.

The moisture which she imparts to the eggs comes from her body and not from running through wet grass, as many suppose. In my part of the country we have no wet grass in February and March, and yet hens set and hatch plenty of healthy chickens in these months.

You may have noticed that on the 19th or 20th day she hugs her eggs very closely and will fight mightily if disturbed at this time. This is nature and this is the reason we say, keep the door of the incubator closed at hatching time.

We say, start the machine at 102° and keep it so for about one week. When the hen begins to set she has all her feathers on her breast, but after about a week they have worn off or she has plucked them off, thus bringing her naked breast in close contact with the eggs, not even allowing feathers to intervene. This, of course, increases the heat and we also run the temperature of the egg chamber to 103°, the same temperature as she maintains at the time.

Now, gentlemen, as I have said, any first-class, well-made machine will hatch eggs; *but* the trouble begins when the newly hatched chicks are placed in the brooder. Brooding chickens artificially is a very unnatural and difficult undertaking. The study of the hen's nature here has been perplexing in the extreme. The one thing, however, that we have understood is that the chick needs heat first and food afterward.

When the chicks are all hatched they should be left in the bottom of the machine for at least thirty-six hours. This is most essential, and is but little understood by the novice. They are not hungry, as many suppose, and would not eat if food were given them. Nature has supplied them with food in the yolk of the eggs, which they must have entirely absorbed before they can free themselves from the shell. Until this yolk is wholly digested they will not crave other food. This the

hen understands and it accounts for the brooding she gives her young for the first twenty-four hours, or longer, of their existence.

Let us now turn to the brooder. The name brooder suggests brooding and brooding means heat; therefore the first consideration is to have the brooder running and thoroughly heated, at a temperature of at least 90° before introducing the chickens. The Prairie State Sectional Hot Water Brooder is, in my opinion, the best invention ever devised for this purpose. It consists of a hover and a short yard or runway. The hover contains an adjustable floor, which can be lowered or raised to suit. The hover contains hot water pipes and it is under these and within, say, three inches of them, that we place our newly hatched chicks.

We must now turn our attention to feed. The best first meal I have ever found is rolled oats or oat flake. It is white, hence easily seen, and dry. A drinking fountain filled with water, the same temperature as the house, is placed before them that they may become accustomed to it at the start. This will prevent their drinking too much, as is apt to be the case if water is withheld for several days. A small box containing chick-size grit, sharp crushed stone or mica, will be found a great necessity and will help them to digest the yolk before mentioned.

After feeding them one day, about five times, on rolled oats, other and more nourishing food must be supplied. There are many kinds of cakes made, similar to old-fashioned Johnny Cake, which are fed in a crumbly state—never soft or watery. I have had great success in feeding Spratt's Patent Chick Meal. Whatever agrees with young chicks is the best food you can give them. This must be learned by experience, as hardly any two breeders will agree upon it. It has been my habit to throw in a little fine grain in the litter of the yards as early as the second day, thus teaching them to scratch, hunt and pick about, as is their nature, and inducing exercise, which is so absolutely necessary for their general health. Here nature is our teacher, and you may have noticed how constantly busy a brood of chicks are with their mother. We must try to copy nature as nearly as possible, and you will find that a brooder chick which is busy from morning until night grows the fastest and thrives the best.

The one ailment which we must fight is what is known as bowel trouble. Over-feeding and bowel trouble will reduce the percentage of your brooder chicks so alarmingly that the bravest and most enthusiastic amateur will give up the artificial method, utterly discouraged. Bowel trouble comes from indigestion and is easily controlled and cured by mixing plenty of grit in the soft mash or food other than grain. Mixed in the food the chicks are compelled to eat it, and thus the proper substance is supplied to their small gizzards, which virtually grind up the food. We must now return to heat. We will say that your chicks are now three days old and are lively and well. They may still be in 90° of heat. If you lift the cover of the hover at night, you may find them all spread

out and many with their heads sticking through the fringe, thus proving that they are too warm. You can now reduce the heat by dropping the adjustable floor one point, say about one inch, and giving your chicks a temperature of about 85 . Too much heat for too long a time will do them as much harm as over-feeding. As chicks start out in life strong, robust and active, we must try to keep them so and make them as hardy as possible.

Next we come to fresh air, Just as soon as they learn to run the length of the small yard (six feet) and know enough to return to the hover for heat, then we must let them outdoors, that they may enjoy that which gives them the greatest degree of strength and health. Even if the ground is covered with snow, sweep away a little space and let them run out into the sunshine if only for five minutes. If it is too cold they will scamper back to the hover to be heated up again. Soon, however, they will repeat the excursion until they become accustomed to the road. But this outdoor exercise cannot well be allowed unless they are strong enough and wise enough to find their way back to the heat. Chicks with hens have a great advantage here, inasmuch as the mother, the natural heat, is always close by and they can run under her feathers for a minute or so, or if she thinks they have run long enough, she will call them or perhaps peck them under.

After chicks are a week or ten days old they should have plenty of whole wheat and cracked corn. Green food can then also be given them. A small cabbage will be eagerly devoured. When three weeks old a little meat will help them grow and will form frame and muscle. This can be given in the form of beef scraps (ground lean meat, soaked) and mixed in the morning mash. This is a substitute for the bugs, grasshoppers and insects which they would naturally find in the fields. As I have said, we must follow nature as nearly as possible and supply artificially what she supplies, if we wish to have strong, healthy chickens.

The feeding question may be summed up in a few necessary principles. Supply strong, nourishing food. Feed only when they are hungry. Give plenty of grit and green food and above all compel them to exercise constantly. Give them as much fresh air as they would get with their natural mother.

The heat problem is a simple one. After they are strong on their legs and very active, reduce the heat in the house until they can stand 70°. This will make them grow faster and make them strong, healthy youngsters.

The time to take your chicks out of the brooder entirely depends upon the climate and season of the year. If they are broiler size and age, say about twelve weeks old, they can do without heat entirely. I have had great success in placing them in outdoor coops made of common dry goods boxes turned on their sides and faced up with poultry wire with door cut through. This prevents prowling animals from de-

stroying them at night. They can be placed in these boxes in April and given the run of the fields or orchards during the day, and you will be surprised how they will grow. These coops give them cool fresh air at night, which is most important for their development.

Having followed the course of the germ from the fifth day of its life until the chick has been turned out to do for itself, we may now give attention to the adult fowl. A few suggestions on care and feed, which are the most important questions of the day in breeding poultry, may be of interest.

Feeding fowls to produce eggs is one mode and feeding them for market is entirely different. A laying hen is treated in a certain way which will compel her to form and lay all the eggs that she is capable of, according as she is of a prolific laying strain or otherwise. All breeds cannot be fed alike, if the best results are sought. What would be a satisfying meal for a Leghorn would induce fat in a Plymouth Rock or Brahma. The light weight, nervous, active breeds like Leghorns may be fed, therefore, much more liberally than the heavy varieties. Especially is this true during the winter months, when the fowls are confined to their houses.

Leghorns will by nature take a great deal of exercise, if not confined in too close quarters. They should have something always in the coops to pick at or scratch for. Brahmas and Plymouth Rocks, on the other hand, if given a full meal say in the morning, will sit around and mope in the sun with no intention of laying an egg. It is best to give them just sufficient to arrest the cravings of hunger and make them scratch and exercise for the rest of their breakfast. Exercise, gentlemen, means eggs; therefore, anything which will serve to keep your hens moving during confinement will promote laying. It is a hen's nature to be busy from early morning until sundown. She hunts the fields diligently all day, gradually filling her crop until at roosting time her crop is full and she passes a comfortable night. If you go contrary to nature and fill a hen's crop before ten o'clock in the morning, you simply induce a fit of indigestion, to which all yarded and cooped fowls are more or less subject, and this is the forerunner of almost all the diseases to which fowls are heir.

Yarded fowls are the modern improved egg machines. Fowls let run, and given free range cannot produce as great a number of eggs, for the reason that they convert a part of their food into muscle and thus reduce their capacity for forming the eggs. In my own case I increased my egg yield 18,720 eggs last year by yarding my fowls.

Fresh air is absolutely necessary for the health of your flock. Windows should be opened wide every day for a shorter or longer time, depending on the outside temperature. Fresh air dries out your houses and dispels dampness, which is fatal to fowls.

The water question is quite a serious matter at the present time.

The habit of filling the water vessels at seven or eight o'clock in the morning, feeding time, is, in my opinion, the height of folly. If we give our fowls a *warm* morning mash to tone up their system after a cold night, we certainly should not give ice-water to chill them. If we study nature again, we find that the common barn-yard fowl, which is left practically to herself and to do as her instincts dictate, does not seek the ice-water in the horse trough the first thing in the morning, but rather takes her breakfast from the fresh, warm manure heap, and after she is well warmed up by food, exercise, and sun, she may, towards ten o'clock or noon, visit the trough to quench her thirst. I have adopted this water system this fall and winter and find that my eggs yield has increased over fifty per cent.

To give you an idea of the vast amount of money the poultry industry represents, I will quote from a statistical table the following: It has been estimated that New York State consumes and sells over $90,000,000 worth of eggs and poultry annually; but New York does not produce 10 per cent. of all this. It comes to her from foreign countries and different parts of the United States. New York State consumes about $45,000,000 worth of poultry and eggs. If New York with over 5,000,000 population consumes $45,000,000 worth of eggs and poultry annually, the United States with over 70,000,000 would consume over $600,000,000 worth.

Mr. John Doherty, being then introduced, delivered the following address:

After acknowledging the invitation and deprecating any claim to be considered an expert, Mr. Doherty went on to say that, after all, there were no special secrets in poultry raising, and modern thought had added but little to the stock of knowledge on the subject. A candid French author had commenced his work by saying that "La connaissance des races de volailles ne s'invente pas," and an examination of old and new works on poultry showed a remarkable resemblance in treatment and ideas. The references to poultry in Aristotle's History of Animals make it clear that the Greeks understood well the art of raising winter layers. The ancient Egyptians are said to have had giant incubators and to have hatched chickens in this way on a scale that makes our own efforts seem insignificant in comparison. Columella treats largely and very practically of poultry, and, among other things, praises the first cross between thoroughbreds, describes the points of a likely cock and a promising hen and regulates the best number of the latter to mate with the former. The tenacity of old wives' theories appears in the fact that not only Columella but Horace and Pliny assert that the long eggs contain the male germ, or will produce a cock, and the round eggs a female. This is commonly believed to-day, although it seems to have no scientific basis. All that is known about poultry is said to be contained in Aldrovandi's "Ornithologiæ," which unfortunately exists only in the

shape of four huge folio volumes in the original Latin, so formidable in appearance that it would take all the courage of the bravest breeder to tackle them.

The chief apparent distinction between ancient and modern breeding lies in the fact that ancient breeds were localized; that is to say, each breed had its locality almost or altogether to itself; while the modern tendency is to the assembling of representatives of all breeds in each and every locality. The Greeks are said to have had only two breeds, a large and a small. The modern tendency is largely due to the facility of transportation, though somewhat also to the mania of breeders for producing new varieties or new strains of an existing variety. When any of these secures recognition in the Standard of Excellence its chances of perpetuation are increased. Breeders who have been stung with the new breed tarantula are quick to take advantage of the appearance of a "sport" showing marked diversities, and, by in-breeding, seek to perpetuate them in its progeny.

It is generally believed that all domestic hens have not been developed from one type of wild fowl, though all such wild fowl may originally have come from a single type. It seems probable that several varieties had already been evolved in the wild state before the process of domestication began. M. Gaston Percheron, in his "Oiseaux de Basse-Cour" has endeavored to fix the types, which he specifies. It seems clear to even a casual observer that the breeds known to us as the Leghorn, Spanish, Minorca and Andalusian are of a common type and must have had a common origin. This appears even more probable when we learn that the *race commune* and *race gauloise*, the two most common breeds of France (in fact, constituting the barn-yard fowl) have the same characteristics; so that the different varieties of this type cover an unbroken territory. M. Percheron calls this the "type classique." It is further confirmed by the fact that by crossing of the Minorca cock on common hens, birds undistinguishable from the common Brown Leghorn can be produced.

Color of Feathers.—There are four essential colors in the feathers of chickens:

Yellow, varying to buff, bay, reddish and brown.

Bluish-gray running to barred, or "coucou" and partridge.

Black.

White.

It is believed that the color varies with the closeness of the breeding, the tendency of in-breeding being towards albinism. On this theory the white is of course albinism, black the next degree removed, as, strange to say, real albinism is said generally to proceed through the directly opposite color in the immediate parents; bluish-gray still one degree out, and yellow or red the stamp of out-breeding. Thus, in the classic type, we have Brown Leghorns, Blue Andalusians, Black Minorcas,

and White Leghorns and Minorcas. In the Asiatic type are the Buff Cochins, Partridge Cochins, Black Langshans and Light Brahmas.

In fancy breeding the colors become fixed in the different varieties, Brown Leghorns always producing Brown Leghorns, and Light Brahmas Light Brahmas. But in Italy the brown birds are not known as, and are not, a separate variety, unless they may have been so bred of late years in imitation of foreign methods. Practically all the chickens of the North of Italy are of the same type, such as would be considered by us as Leghorns, and they are bred and mated without regard to color, on the old principle of mating a likely hen with a likely cock, no matter what the color. They are all, of course, thoroughbreds. The result is the production of chickens of all the colors known to the breed, not with the uncertain plumage of mongrels, but with the clearly defined markings of thoroughbreds; in fact, exactly the plumage fixed and reproduced by fancy breeders through in-breeding.

In China, also, it is said that chickens are bred on the same principle, without regard to color, the same breeding-yard containing hens that would be known to us as Buff Cochins, Partridge Cochins, Black Langshans and Light Brahmas. The progeny is of varied colors, consequently, but the variation is limited to the variations in the ancestors, an indication that the race is thoroughbred without regard to color.

If correct, this seems to indicate that the fixing of color varieties is unnecessary for the retention and reproduction of any form of thoroughbred coloring. On that theory there is no more reason for separating breeding of the Leghorns of different colors than short horn cattle or thoroughbred horses.

The further moral to be drawn is that chickens should be bred only for utility—eggs and table purposes—and that they are no exception to the universal rule that breeding for the greatest utility ensures also the highest type of beauty.

New Breeds.—New breeds can be produced only by the crossing of different existing breeds. Thus the Plymouth Rock is said to be the result of crossing the American Dominique cock on the Black Java hen. No rules can be laid down for new crosses, and no result can be foretold, as all efforts are entirely empirical. The crosses, however, should not be too violent, as between Leghorns and Asiatics, but rather between breeds which approach each other in size and general characteristics. Violent crosses often produce excellent layers, but the breed is difficult to establish. A breed is not established until the progeny breeds true within the breed. Breeding true cannot be obtained without close in-breeding.

In-Breeding.—Full brothers and sisters should not be bred, being of the whole blood. Some fowl (for example, pigeons) will stand such breeding, but chickens will not. Ordinarily the hen is mated with her sire, the female progeny of such mating is bred back to the same cock, being of course her grandsire, the female progeny of this mating again

bred back to the same cock, her great grandsire. This makes the progeny contain seven-eighths of the sire, which is the extreme limit of in-breeding feasible with chickens, since the constitution weakens and the colors become light and washy. The hens containing seven-eighths blood must therefore be bred to a cock of another family or strain of the same breed, and the resulting progeny again in-bred until seven-eighths blood is reached.

STRAIN.—A strain is a family of any breed produced by in-breeding, as above described, and containing usually some distinct characteristics, which are considered of value and perpetuated truly in breeding. These characteristics must not be so violently novel as to carry the birds out of the limits prescribed by the Standard of Excellence for the breed; and indeed, to be of value, the birds should score high according to the Standard. When strains are strongly established, the crossing of two strains usually results very disastrously as to the marking of the feathers, which is nearly as uncertain as in the crossing of two different breeds. With birds of an established strain it is absolutely necessary to resort to in-breeding, and, starting with good specimens, it is comparatively easy to maintain a high standard of excellence in markings by line breeding, as above described, either to three-fourths or to seven-eighths blood.

SPORTS.—Breeds or strains sometimes originate with a chance specimen, thoroughbred on both sides, but developing some special and novel characteristic. To establish this characteristic it is necessary to breed the bird back, according to its sex, to its sire or dam, and continue such line-breeding until the new characteristic is established.

SEPARATE BREEDING OF COCKS AND HENS.—Of late years many breeders, taking note of the tendency of certain cocks and hens to throw well-marked cocks, while the female progeny were inferior in marking, and the tendency in other cocks and hens to throw well-marked females, have resorted to what may be called sub-strain breeding; that is, breeding certain individuals for cocks only and others for hens only—discarding, for breeding purposes, those specimens of the sex not specially bred for. This has so far been attended with good results, but it is maintained that it will result in the establishment of different strains, and that in the end the mating of the males and the females will be practically crossing different strains, with the usual disastrous result as to markings.

EFFECT OF IN-BREEDING.—It is generally admitted that in-breeding has a tendency to weaken the constitution and reduce egg production, while, on the other hand, it fixes and reproduces points of either oddity or beauty.

IMPORTANCE OF MALE.—All strains and breeds of merit have started from a great male. This is true not only of chickens but of most other domestic animals. For example, the American trotting horse owes nearly everything to Hambletonian, and short horn cattle are all derived from Mr. Collings' great bull. Such great males have the faculty

of impressing the desired characteristics, to a marked degree, upon all their descendants. A standard horse, holding a large share of the blood of Hambletonian, is almost certain to be capable of development into a trotter. Given the great male, breeding comes comparatively easy. There is, unfortunately, no rule for producing a great male, nor can one be distinguished except by results.

Selection of Individuals for Breeding.—In fancy breeding the points of each breed are laid down in the Standard of Excellence, and it is well to make selection in accordance therewith. It is also important to make sure that the cock bears a strong resemblance to his sire, as that is the best guarantee that he will himself breed true. It is better to have the cock a little small rather than large of his breed. Large cocks are apt to lack activity, and, on account of their weight, to injure the hens. Extra large birds are more apt to be produced from large hens than large cocks. If layers are desired the hens should be of good laying stock and themselves good layers. When a pullet has laid well her first winter, and it is desired to breed her, she should be kept from forcing food during the next fall and early winter, so as to keep her from laying until a short time before the time intended for setting the eggs. Two-year olds, both cocks and hens, are best for breeding. Old hens should be mated to young cocks, as the produce of two old parents is usually weak. It is generally believed that young cocks are apt to throw a large proportion of cocks and old ones a large proportion of pullets.

Number of Birds in Pen.—Each pen contains one cock, with as many hens as it is thought best to breed to him. Opinions differ greatly as to the best number of hens for each cock, some authorities advising as low as two, and others as high as twenty-five. In reality all depends on the vigor of the cock. In-bred cocks have frequently so little vigor that they are unable to serve for more than four or five hens. A vigorous cock should have from twelve to eighteen hens, and will throw better chickens with that number than with four or five.

Time for Mating.—Mating usually takes place in the months of March, April and May. If winter layers are desired, May 15 is the latest date for hatching. Incubation takes three weeks, and the hens require, say, ten days additional to become accustomed to their new home; so that the pen should be made up some thirty-two days before the date of first intended hatch. If the hens have been running with cocks of other breeds, the additional ten days mentioned with the new cock will insure the eggs being thoroughbred.

The time for mating must, of course, partly depend upon the fowls themselves. Some hens of the closely bred strains of large breeds will not lay before May, and the cocks do not awaken to life before that month, so that it is useless to expect to set eggs before about May 15. If the hens which it is desired to set lay early, they should be penned early, as the early eggs, say from the tenth to the fiftieth, are the most vigorous,

and eggs after the fiftieth are apt to produce weakly chickens. Eggs of moderate size and smooth shape should be selected.

When the pen has once been formed, no additions should be made.

WINTER FOOD FOR LAYERS.—Hens need a great variety of food, but the food, when once determined on, should not be changed; that is, the complete variety should be fed, as far as possible, every day. Early in the morning of five days in the week a warm mash should be fed. The mash may consist of boiled barley, fine middlings, corn meal, meat scraps and vegetables. It should not be quite a full feed. If fed more than five mornings out of seven a mash is apt to loosen the bowels. The next meal should be of wheat scattered through the litter. Another excellent grain food is buckwheat threshed with the flail and not separated from the chaff. At night a full feed of corn, heated as hot as the hand can stand. This digests slowly and will keep them comfortable during the long winter night. On mornings when the mash is not provided, wheat may be fed, with meat at noon and warm corn at night.

The water should be lukewarm.

FORCING FEEDS.—There are three forcing feeds—meat (ordinarily in the form of ground green-bone, with a good deal of the meat on the bone), milk and fish. Milk is expensive, and fish cannot be conveniently obtained, except near the sea-coast, and too much raw fish will give an unpleasant taste to the egg. It is said that boiled fish will not do so. Ground green-bone is, therefore, the forcing food chiefly depended on. Sufficient quantity is a pound per week for every three hens.

Green food should be before the hens always. The most common green food is cabbage. The best is fine rowen, or second crop hay, with a fair admixture of clover. If not very fine it must be chopped.

FOOD FOR CHICKENS.—Chickens need no food for the first twenty-four hours. Then the best foods are hard boiled egg, and bread soaked lightly in milk; if fed too soft it will cause bowel trouble. For drink, use fresh milk in very small shallow dishes. After a couple of days dry oatmeal and dry bread crumbs may be fed, and, shortly after, cracked wheat and cracked corn.

SEPARATION OF CHICKENS.—Chickens must be kept entirely separate from the larger fowl, and should not be fed with the hens or allowed to roost with them till about four months old. The greatest mortality among chickens is due to a neglect of this precaution.

NECESSITY OF SHADE.—Every poultry yard, whether for hens or chickens, should have plenty of low bushes for shade. The sun is a constant enemy of poultry. It kills little chickens when exposed to its direct rays, exhausts and weakens the older fowl, takes the lustre out of colored feathers and turns white feathers brassy. Even in winter it should not be allowed too free an entrance into the poultry house. In those houses built with large windows on the south side, it produces a great heat on the warmer days in winter. This, of course, falls rapidly after sunset,

and as the hens cease their activity and go to roost at the same time, the two-fold failure of their supply of heat is apt to leave them chilled during the long winter night and to bring on roup or other diseases.

DEFORMITY IN CHICKENS.—Most deformities in chickens are caused by their forcing themselves through openings too small for them, causing some of their tender bones or joints to be twisted or thrown out of place. Wire intended to confine chickens should be fine enough for that purpose, and slats intended to allow them to pass through should be wide enough apart to give them ample room.

CROSS BREEDS FOR LAYERS.—A first cross between thoroughbreds sometimes produces better layers than either of the pure races. The most celebrated cross is that between the Brown Leghorn cock and Light Brahma hen. Another excellent cross is the White Leghorn cock and the White Plymouth Rock hen.

But none of these cross-bred fowl should themselves be bred, as they do not bequeath their best characteristics.

After a vote of thanks to the speakers of the evening, the Farmers adjourned, to meet on the evening of Tuesday, February 15, 1898.

The "New York Farmers"

HELD their final meeting of the season of 1897–98 at the Metropolitan Club on the evening of Tuesday, February 15, 1898, the President in the chair.

In opening the proceedings, Mr. Appleton spoke as follows: Fellow Farmers: As you are aware, the subject for discussion this evening is the tobacco plant. We have several learned and accomplished gentlemen here who will address you and give you an opportunity to discuss with them that question of very great interest. It is to be regretted that, in addition to these gentlemen who are so competent to instruct and enlighten us, I was unable to procure gentlemen from, say, the States of Kentucky and Virginia, where the culture of the tobacco plant is of very great importance. I have the pleasure of introducing to you Professor Milton Whitney, who is connected with the United States Agricultural Department at Washington, and who has especially to do with the subject of soils and the adaptation of plants to the different soils. In his remarks he will especially consider the adaptation of the tobacco plant to certain soils.

Professor Whitney—Gentlemen: Doubtless few of you realize the extent of specialization in tobacco to-day. A very few years ago tobacco was sold as tobacco, without very much distinction as to grade or class, as we now recognize them, and without very much attention to the locality from which it came. To-day there is a very marked degree of specialization in the tobacco industry; and I have simply to speak of the cigar to show you to what an extent this has been carried. A domestic cigar to-day is made up of a filler that comes from the heavy limestone soils of Pennsylvania or Ohio; of a binder that comes from the medium loams of Wisconsin; and it is wrapped with a leaf coming from the Connecticut Valley. Not only so, but a manufacturer who has bales of Havana tobacco in his warehouse from the same plantation, by selecting leaves of different lengths from different parts of the same plant, can make up as many brands of cigars as he wishes—perhaps ten or fifteen different brands—each having a sufficiently different flavor to be distinguished under the name of a brand.

It is a curious fact that the cigar tobacco is found in its perfection in the tropical countries, in Cuba, in Sumatra, in Florida, in Mexico and in Texas; and then there is a skip. It passes over our Middle States, and the type is found again in Massachusetts, Connecticut, Pennsylvania, Ohio, Illinois and Wisconsin. They do not grow domestic cigar tobacco in the Middle States. The tobacco that is grown there is used for cigars

but not for our domestic market. It is not fit for our purposes but is mainly sent to foreign countries and is used in England, Germany, Italy, Austria, Spain and Africa.

In the Middle States there are three types of tobacco: first, the export tobacco proper; second, the manufacturing tobacco, which is used for chewing, smoking and snuff; and then a third form, the cigarette tobacco, a bright yellow leaf.

The influence of climate on the class and grade of tobacco produced is probably very marked. Undoubtedly the climate determines the class of tobacco that is to be grown. It is certain that we have the same kind of soils in the Middle States, in Kentucky, Tennessee and Virginia, upon which the cigar tobacco is grown in Pennsylvania and Connecticut; but the cigar type is not produced on those soils under the climatic conditions there existing. It is a curious thing, however, that it is impossible to tell, from a study of the meteorological data that are usually supplied, (the temperature, rainfall, humidity) what the conditions are that determine the character of the tobacco which can be grown in any particular section of the country. The tobacco plant is of an exceedingly sensitive organization; more sensitive than our meteorological instruments. It will grow well on all kinds of soil. It will grow even more generally than wheat or corn. But it is only upon certain soils and under certain climatic conditions that it has the quality which finds for it certain market demands.

Specialization has gone so far to-day that a nondescript tobacco has no value whatever. It is only the tobaccos that are produced under certain conditions of soil and climate that have any marketable value. Although we know that climate must have an effect upon the crop, although we can see it to a very marked extent, we do not yet know why it is. We cannot account for the differences in the tobacco produced; but it is certainly very great. The island of Cuba, from which we get our finest cigar tobacco, is not by any means all a tobacco region. We get our best cigars from the extreme western end of the island. As we go east the tobacco changes; it deteriorates; and we use but little of the tobacco that comes from the extreme eastern part of the island. Furthermore, even on the island of Cuba, even on the western end of the island, where we get our finest tobacco, we get the best tobaccos only in certain very limited areas. In the first place, we do not get tobacco that is grown near the ocean, nor near any large body of water. Such tobacco usually has a very poor burn. It is not suitable for cigar purposes. That is one limitation. The tobacco of Cuba is, therefore, not grown near the coast. In Sumatra the same conditions prevailed. Then, for some reason which I cannot explain, because I have not personally visited the island, it is only in certain locations, even in the best districts, where the best Havana tobacco is produced.

Coming to our own country, I know that the influence of soil on the

character of tobacco is exceedingly marked. It is a very interesting thing for a northern visitor to North or South Carolina to see, on a man's place, an area of light sandy land which a few years ago had no value whatever; but upon which now a very fine quality of bright yellow tobacco, used for cigarettes and for plug wrappers, is produced. Ten years ago, when I was in North Carolina, I saw a field from which crops worth $500 or $600 an acre were taken from land which had absolutely no value for general agricultural purposes. On the same place, but across the road, was a soil which was entirely unsuited to this tobacco, upon which it could not be produced. It was a heavy clay, adapted to the manufacturing tobacco for chewing and smoking, and hardly paid expenses; and that was the type on that field.

The Department of Agriculture has made a very exhaustive study of the soils of the principal tobacco districts of the country. We have based the classification upon the physical texture of the soils. We find that a soil that contains a large percentage of clay, that holds a relatively large amount of water, produces a large, heavy, thick leaf. A light, sandy soil, on the contrary, produces a thin textured mild tobacco, which is suitable for another purpose. Generally speaking, the wrapper leaf which is used for cigars is produced on a very light sandy soil—typically, the soils of the Connecticut Valley, with which many of you are quite familiar. The soils are very poor. They have very little value for other purposes. As a matter of fact, many of these soils are so ill adapted to general agricultural purposes that when the style changes and we demand dark cigars, the use of such soils for tobacco culture is given up, as has been the case in the past. When our market demands a dark, heavy cigar, which it did a few years ago (and which perhaps it will again) the heavier soils of Pennsylvania produce the heavier, richer, stronger wrapper which is then used; and the lighter soils of the Connecticut Valley, the light river lands of Pennsylvania, have to be given up, or special means taken to darken the leaf, in curing, in order that it may sell.

The tobacco soils of Pennsylvania are unlike those of Connecticut—that is, unlike the lands which are at present cultivated in tobacco in Connecticut.

The Pennsylvania soils are a heavy limestone clay, consisting of at least thirty or thirty-five per cent. of clay. These soils maintain about twenty per cent. of moisture on the average. The Connecticut Valley soil, on the other hand, has about seven per cent. of clay and maintains about six or seven per cent. of moisture. The Ohio soil is quite similar to that of Pennsylvania. It is a heavy clay soil, in the Miami Valley, and produces a very strong type of cigar tobacco, which is used at present almost entirely for filler purposes. The Wisconsin soil comes between the Pennsylvania and Connecticut soils and it produces not the best filler nor the best wrapper. Wisconsin is therefore known at present as a "binder" State.

In the tobacco regions of Kentucky and Tennessee the soil varies considerably; and the character of the soil, together with the character of the season, very largely determines the class or type of tobacco that is grown. It determines whether it is fitted for the German or the Italian or the Spanish or the African market. This can be largely controlled through methods of curing; but it is very largely dependent upon the character of the soil; and the different districts in the general area are known to produce the general types adapted to these different countries. Even in this export tobacco specialization has gone so far, and the requirements of each of these foreign countries is so peculiar, that careful attention has to be give to the grading, the sorting, the curing and separation of these tobaccos, to adapt them to the countries to which they are to be exported.

The manufacturing tobacco lands of Maryland, Virginia and North Carolina, upon which the tobacco industry began (which has been closely identified with the development of our country from the very earliest days), are not holding their own. They are being, to a very large extent, abandoned. The old tobacco fields around Lynchburg, Danville and Charlottesville, which were once the centres of a tobacco industry, are now largely given up to other crops. The Burley tobacco, from the limestone soils of Ohio, has largely taken their place. It is supplying the world now with the trade that Virginia and Maryland used to supply.

The most interesting phase of the tobacco problem which has come up in recent years is the development of tobacco culture in Florida. The war with Cuba has given a great impetus to the tobacco industry of that State. The yield has increased three-fold. A year ago the production was about a million pounds; this year it was three million pounds; and the acreage is being very rapidly extended. The tobacco is grown on three classes of soil. In the western part of the State, the old tobacco district around Quincy has the red soils, similar to the red lands of Georgia and South Carolina. If any of you are familiar with the red lands around Aiken, S. C., you will know the character of soil upon which the cigar tobacco is being grown now in western Florida. They are producing a very fine type of tobacco, using both the Cuban seed and the Sumatra seed for the wrapper leaf. It is the old tobacco district of the State, where a very superior quality of tobacco was grown long before the war. The newer districts, the districts which are atracting attention in the tobacco markets at present, are on the peninsula in southern Florida, and the tobacco is grown mainly upon the hammock soils and, to some extent, upon the high pine land soils. The soil of each is a very light sand, with an exceedingly small amount of mineral matter or plant food of any kind. They have to be very heavily manured; but they produce a large crop and they can make two main crops a year —that is, a spring crop and a fall crop—and they can get from one to three sucker crops in addition from each. That is, they harvest their

first crop and then allow a sucker crop to mature, which they also cut; and then a second and sometimes a third sucker crop. Then, in the fall, they put in another crop, and harvest two or three sucker crops from that. On the hammock soils of Florida, with from fifty to seventy inches of rainfall, they find it necessary to irrigate their land. They have a system of iron pipes to supply the overhead spray system, and they irrigate the land thoroughly once or twice a week. This, of course, adds considerable to the expense. The high pine land soils of Florida, the truck soils of the State, have this peculiar property: that although they are composed of a coarse sand yet they maintain their moisture in a wonderful way, and the crops growing on them will stand a long drought. It has been stated, and I believe it is true, that a crop of tomatoes planted on the high pine land soils of Florida will grow to maturity without any rain whatever. The soil has but a small amount of clay—hardly one per cent. It maintains, on the average, about four per cent. of water, and the amount differs very little from day to day. The soil carries the crop through without the necessity of irrigation. It is hard to believe this; but a confirmation of it was seen in southern California this last year. On a sandy soil near Pomona a second crop of tobacco was being harvested in September. The crop had been planted in May. The first crop was hanging in the shed and the sucker crop was being cut at the time of my visit. The records show that there had been no rain since some time in April, while the soil had not been irrigated at all. When I visited the place the soil immediately under the surface was still moist and in excellent condition for growing crops, although it had been nearly six months since rain had fallen. It was a sandy soil, thirty feet to the water level in the well, and with no apparent reason for the remarkable property possessed by the soil.

One of the most important things in the production of tobacco in all countries, and particularly of the cigar tobacco, is the method of curing; and that is a matter that is receiving very close attention in Florida. The proper curing of the tobacco is something which is of vital importance to the industry of that State, as well as of all the cigar producing States of the country. In Florida the process of curing is based upon the Cuban process of sweating; and it is done in a very intelligent way. Briefly, the tobacco, after being cut and barn-cured and sorted, to a certain extent, is put into a pile and fermented. The temperature finally has to rise to about 130 or 140 degrees; but it must not attain that temperature too quickly or the tobacco will be spoiled. The whole art of curing is to allow the fermentation to go on just fast enough; and it must be watched day and night without cessation. If the fermentation goes on too rapidly the pile is immediately torn down, the leaves are shaken out and aired, if necessary, and the tobacco is immediately piled up again to go through the further process of fermentation. This is repeated eight or ten times before the fermentation is completed.

There is a further process of petuning which the Cubans practice; and it is done, to a certain extent, in Florida. It is believed to add much to the flavor of the leaf. The petuning liquid consists of an infusion of tobacco stems, with other substances, the ingredients of which are, in a large measure, kept secret, as they are supposed to constitute the secrets of a plantation. Sour wine is put in, or brandy, and things of that kind, and the tobacco is either dipped into this solution or it is sprayed with it.

One of the requirements of cigar tobacco, and a requirement which is giving the Florida grower a great deal of trouble at the present time, is the proper aging of the tobacco after it comes through the fermentation process. It is a very singular thing, but the flavor of tobacco that has been kept in the bale for two years is just as different from that of the tobacco after it comes from the sweat as can be imagined. Aging has the same effect on tobacco that it has on wines and whiskeys. Tobacco mellows with age. The longer it is kept the more mellow and more uniform and mild the flavor is. And here arises a matter which is apparently a simple thing but which is having a great effect upon the development of the tobacco industry of Florida—the expense of keeping the tobacco in the bale for a sufficiently long time. I went into a house in southern Florida this last month and smoked some of the cigars that they had made from their last spring's crop. It had been in the bale but three months. I saw at once it was too fresh. In the first place, you could tell from the way it smoked and from the flavor it was a fresh tobacco. It had not aged. In the second place, the Florida leaf has to be handled in a peculiar way. A wrapper can usually be put on a cigar as soon as it is properly fermented; but if the Florida tobacco is used too soon it gives an appearance to the cigar which would condemn it with any one who was at all a connoisseur in cigars. When it is worked and rolled, as the cigar has to be manipulated, the oil in the cells seems to break out and the cigar is covered with dark spots, faint at first but still perceptible to any one who understands cigars; and if you put such cigars in your pocket and carry them for a day or two, if they get at all moist they become as black as your hat and smoke badly. They draw badly and swell up in a very disagreeable manner when smoked. Now, Florida tobacco, unlike most of our wrapper tobacco, has to be kept at least six or eight months before it can be worked into cigars. And the Florida growers are doing themselves great injury—they are doing the State a great injury—in making up their tobacco before it is properly aged. I spoke of this to the gentleman in whose warehouse I was, and he said: "But this is the trouble: I have two crops in here now, my last spring's crop and my last fall's crop; and I have another crop ready to set out, and I would have to handle five or six crops of tobacco before you say this tobacco will be ready to go on the market." He said, "I cannot do it. I have $8,000 or $10,000 worth of tobacco in the warehouse now and

I cannot afford to hold it." This is a great problem. It is a very serious problem in the production of the Havana type of tobacco in Florida—the question of holding the tobacco sufficiently long to let it age. Some one has to bear the expense of holding that tobacco for at least two years, of paying the insurance, of losing interest on the investment, in order simply to let the tobacco lie there and mellow by age.

The Department of Agriculture has gone far enough in the study of tobacco soils of the principal tobacco districts of the country to enable us to classify them; to predict what kind of tobacco, what class of tobacco, and almost what quality of tobacco, the lands will produce under good cultivation. And having worked out the principles upon which the classification is to be based, having determined the condition which influence the quality of the tobacco, we are ready now to go further and to map the soils of the tobacco districts of the country. We are preparing now to make field maps similar to those of the geological survey, showing the character of the soil and the kind of tobacco, the grade and class of tobacco, that can be produced on the different soils of the important tobacco districts of the country.

Commodore Gerry—I would like to ask the gentleman two questions. I would like to know if he has looked at the effect of guano for the purpose of developing the crop; and, secondly, what the effect is upon the cigars produced?

Professor Whitney—It is a little difficult to answer, for the reason that the different soils require very different fertilizers. On the Florida soil which I have just visited there is nothing better than guano; but it has to be supplemented by an addition of potash. The soils are very deficient in all kinds of plant food and it has been ascertained that the guano is not rich enough in potash. Dr. Jenkins will doubtless give you the results of some of the experiments had in the Connecticut Valley. They have paid a great deal of attention there to the effect of manures on the character of the tobacco. I know he will tell you that he thinks commercial fertilizers of certain kinds are better here than guano.

I would call your attention to the cigars that I have passed around as being made of Florida tobacco with some Havana in the filler. The wrapper is a Florida grown Sumatra wrapper and it is claimed that it is superior to the imported. It is less bitter for one thing and is equally as good as a wrapper. I think you will find them excellent. They give promise of a fine product from that State.

Commodore Gerry—Of what make is it?

Professor Whitney—This tobacco was grown at Quincy. It was made up in New York.

Mr. Burden—I would like to ask the Professor how long the tobacco is kept?

Professor Whitney—The Havana tobacco should be kept at least two years.

Mr. Burden—How long *is* it kept?

Professor Whitney—I am sorry to say it is not very often kept so long; but the imported tobacco, when things are in the normal condition in Cuba, is kept for two years before it is made up into cigars—whether it is kept there or in this country. Any reputable manufacturer would keep it for at least two years from the time it was fermented until it was made up into cigars.

Mr. Burden—Can they not use the Florida phosphates as a fertilizer?

Professor Whitney—The Florida phosphate would not be sufficient. It could be used in a mixture.

Mr. Burden—Can the Florida phosphates be used?

Professor Whitney—Oh, yes.

Mr. Burden—Are they not better than guano?

Professor Whitney—They would be as good, but they must be mixed with nitrogenous matters as well as potash salts for the Florida soil.

Mr. Appleton—I shall now have the pleasure of introducing to you as the next speaker, Dr. E. H. Jenkins, Director of the Experiment Station of Connecticut, resident in New Haven.

Dr. Jenkins spoke as follows: Tobacco is distinctly American.

In the first place, the plant itself is aboriginal here. Of the 82 known species of *Nicotina* 68 are native on this continent.

And again, tobacco smoking was first practiced here and introduced by the early voyagers into the old world. Smoking is an American virtue—one of the lesser virtues, to be sure—which, like that other distinctively American virtue, total abstinence, may be carried to such an excess as to become a positive vice.

The Chinese, to be sure, claim that tobacco was used in their empire long before the dawn of our civilization; but China claims prior use of everything, from the doctrines of the Sermon on the Mount down to gunpowder and playing cards. It is only poetic justice that now Russia and Germany, in the matter of unfounded claims, should be paying China in her own old coin.

And once more, the growing of tobacco was at first only an American industry, and to-day it continues to be one of our leading farm crops. Long before the settlement of Plymouth, somewhere about 1560, tobacco was introduced into England. The use of it spread with wonderful rapidity. Soon followed the abuse of it, first by the smoker, and then, in the other direction, by the moralist. It so incensed that "most high and mighty Prince, James, by the Grace of God King of Great Britain, France and Ireland," "Defender of the Faith," *et cetera*, that he issued, in 1603, his famous "Counterblaste to Tobacco;" a state paper which has contributed very much to the gayety of nations, and is not really eclipsed even by the recent speeches of William II of Germany and his brother. The three together are the finest specimens extant of intellectual hiccoughs. Of smoking, the Defender of the Faith said:

"It is a custom loathsome to the eye, harmful to the brain, dangerous to the lungs, and, in the black stinking fume thereof, nearest resembling the horrible Stygian smoke of the pit that is bottomless." "It is like hell in the very substance of it, for it is a stinking, loathsome thing; and so is hell." From this it would appear that the Defender of the Faith must have been pulling at a Wheeling stogie, which answers perfectly to this picturesque description given by the monarch.

The extent of the trade may be judged from the fact that in the month of June, 1619, twenty thousand pounds of tobacco were shipped to England alone from Virginia.

In 1620, before our Pilgrim Fathers landed on Plymouth Rock, ninety young women were brought to Virginia, each chargeable with the cost of transportation, which was 120 lbs. of tobacco; a debt cheerfully discharged by those tobacco planters who married them.

Forty years later, we find the Virginians persecuting Quakers, if not as painfully, yet more expensively than was done in New England, by punishing with a fine of 5,000 pounds of tobacco whoever brought a Quaker to live in the colony, or who entertained one in or near his house, to preach or teach. It cost more in those days to harbor one Quaker than to buy 41 wives. Since then there has been less disparity in these quotations.

This is not the time and place to go into the history of the culture and use of tobacco. I allude to these things merely to remind you that this history is full of interest to the moralist, the physiologist and the political economist.

King James, the Defender of the Faith, issued his "Counterblaste" and then thriftily filled his coffers with the import duties collected from the tobacco trade. Pope Urban the Eighth, another Defender of the Faith, issued a bill against the weed.

Priests and Sultans in Turkey and Persia, likewise Defenders of the Faith, declared its use a sin against their holy religion; and, immediately, Persians and Turks became inveterate smokers. The Emperor of China prohibited its use and it soon became well-nigh universal in his empire.

No weed has been so spoken against as tobacco. No crop raised today is used by so large a fraction of the human race as tobacco; no other bears so heavy a burden of taxation; no other brings in so much government revenue.

In the United States 700,000 acres of land are devoted to tobacco culture, of which there are about 8,000 acres in Connecticut and 5,700 in New York. Of the whole crop of the country, amounting to 496,000,000 pounds, Connecticut raises 14,000,000 and New York about half that quantity.

All the tobacco raised in this country belongs, botanically speaking, to two or, possibly, three botanical species; and yet there are more than

sixty varieties of these three species which are grown by farmers, and all these are quite distinct in shape, color and quality of leaf. Each of these varieties has special value for some particular kind of tobacco product and is valueless for most others.

To illustrate. We have three general classes of tobacco: Chewing tobacco, export tobacco, and pipe and cigar tobacco. Within the same class, too, we have a number of types; the type being based on a certain aggregate of qualities; as, for instance, the wrapper leaf type, which in our states includes the New England Havana, the Connecticut Broad Leaf and a few others.

Now, the raising and curing of each class and type of tobacco is a business by itself in its methods of culture, harvesting and curing; as distinct from the others as the business of a creamery is distinct from that of a cheese factory. One could no more raise bright Virginia plug wrappers in Connecticut, in the way that we raise wrapper leaf, than one could make cheese in a churn, or graft figs on a thistle.

Of the methods of raising cigar wrapper leaf I have some knowledge, but I have absolutely no spot knowledge regarding any other class or type of tobacco. I make this disclaimer to avoid, if I can, a judgment like that rendered against a business competitor by an acquaintance in the tobacco trade: "You buy that man for what he knows about tobacco, and you sell him inside of a year for what he thinks he knows about it and you make bargains every time. It was better than a fire."

Most of the tobacco raised in New York is of the same class as our Connecticut leaf, used exclusively in the cigar manufacture, either for wrappers or binders.

We all understand that a cigar is made of three parts: the filler, claimed to be Cuban tobacco in all the better grades of domestic cigars; the binder, which holds the filler together; and, on the outside, the wrapper, which gives style to the cigar, which must suit the whims of the smoker and by which alone he judges, in most cases, of the quality of the cigar.

The only tobacco which it has paid our farmers to raise is wrapper leaf. In raising this leaf, character and texture of soil is a controlling factor, as, indeed, it is with many other crops. Failure to consider this adaptation of crops to soils has been the cause of much unsuccessful farming. If the soil is not of itself well adapted to growing tobacco, it is as senseless to try to make it so by irrigation, drainage, fertilizers, or what not, as it was for Saul of Tarsus to kick against the pricks.

First rate tobacco leaf can be grown only on very light, naturally unfertile, sandy loams. Rather fine sandy soils, destitute of silt or clay, are the best. If only a small quantity of clay is present, the leaf will be too dark to suit the trade. If the soil is retentive of moisture, the leaf will be heavy, gummy and undesirable and, therefore, unsalable at any paying price.

This leads us to notice what the trade calls for in a wrapper leaf and what the grower must have to make tobacco growing pay.

Color, burn and texture are the three things which the grower has chiefly to consider. At present the trade calls for a very light cinnamon brown shade, which must be uniform, not mottled. The leaf when burned on a cigar must leave a white or light gray hard ash, which does not flake off and fall into one's bosom or over his waistcoat, and it must not 'coal'; that is, have a black, charred ring just behind the ash on the burning cigar. This is sure to give a bad flavor and taste. The leaf must also burn freely and, when lighted, hold fire for a reasonable time. It must have a soft, silky texture, glossy surface, and the elasticity of a piece of kid, so that it may be drawn smoothly and closely about the cigar. There are many other things to be considered in the leaf, but those I have named are the most essential.

You will notice that I have not said a word about the flavor. We do not want flavor in our Connecticut tobacco, for if we have much of it it is likely to be bad. Flavor, in a Connecticut wrapper, is like self-righteousness in a Christian, the more he has of it the worse off he is. Perfect burn, color and texture we can get in this northern climate; flavor, a delicate and agreeable flavor, we cannot get, or, at least, we have not got it. Flavor is, I think, conditioned largely by climate; the other things by soil and fertilizers. So we desire the leaf to be neutral, without taste, as far as may be, and get the flavor wholly in the Cuban filler.

To get these qualities of leaf is the problem of the grower; a much more complicated problem, you see, than meets the ordinary general farmer.

The grower finds that, other things being equal, he gets his best leaf on land where tobacco has been raised before. It is not a crop which can be raised in rotation. There are fields in Connecticut on which tobacco has been grown annually for more than forty years which is of better quality now than it was twenty years ago.

For fertilizers, animal manures, like slaughter-house refuse, dried blood and tankage, cannot be freely used. They make the leaf thick, rank and bad flavored. All chemicals containing chlorides must be avoided. They are likely, while giving a large crop, to impair the burn of the leaf, make it coal on the cigar and fail to hold fire.

The use of sulphates in large amount, and particularly of superphosphates—which contain sulphuric acid—is also likely to impair the burn.

The most commonly used tobacco fertilizers in our State are the vegetable forms of nitrogen: cottonseed meal, castor pomace and linseed meal, tobacco stems—the midribs of the leaves from cigar factories—and some form of carbonate of potash, either the pure carbonate, wood ashes or cotton hull ashes.

Enormous quantities of these cotton hull ashes, from the Southern

cotton oil mills—where the hulls are used as fuel—are brought to Connecticut annually and bought by our growers for from $40 to $45 per ton, for use on tobacco land. While the actual potash in these ashes costs nearly 2 cents per pound more than it does in the German potash salts, most growers prefer the ashes.

No crop is so heavily fertilized with us as the tobacco crop. This is because, in the first place, it makes very large demands on the soil—a tobacco crop of 1,800 pounds of cured leaf per acre takes somewhere about 100 pounds of nitrogen and 150 pounds of actual potash from the land—and, in the second place, the crop is always raised on soils which can of themselves yield little to the crop. An average dressing per acre is 1 ton to 1½ tons of cottonseed meal or of castor pomace, from 500 to 1,500 pounds of cotton hull ashes, both applied broadcast, and 600 pounds of some mixed fertilizer, as a "starter" in the drill, the whole costing somewhere from $43.00 to $76.00 per acre.

The plants are started under glass or cotton cloth in beds, and are set in the field from the middle of May to the middle of June.

Tobacco seed keeps its vitality from 7 to 10 years, and the grower raises enough to meet his needs for about this length of time. Our Connecticut Havana seed comes originally from Cuba. The plants of the first Connecticut grown crop will be like Cuban plants in size, very much smaller than suits our trade, and the qualify of the leaf is totally unlike either Cuban or Connecticut grown tobacco. It is coarse, thick, mottled and almost worthless.

The seed grown from this crop produces larger plants, and each successive year the leaf gains in size and quality. About the fourth year the type has completely changed to what we call "Connecticut Havana" and the quality is right.

This whole crop is allowed to seed and this seed is used as long as it can be, because the next crop of seed from this will yield a leaf rather large for our trade.

I know no other plant which, under changes of climate or soil, changes its quality and habit of growth so readily as tobacco.

The details regarding the care of the crop in the field we have not time to notice, and these pictures will, perhaps, explain all that interests one not personally engaged in the business. They were all taken on an experiment field where for six years I have been experimenting on the culture and curing of this crop.

Our experience in fighting cut worms is worth noting, because the method used is applicable to many other crops. These worms attack the plants within 48 hours of setting, and sometimes destroy from a quarter to a half of the young plants, which must be at once reset. Often it is necessary to go over the field half a dozen times, to set again the missing plants. The worst of this is that the crop starts unevenly, part of the plants—those last set—being unripe when cut and making inferior to-

bacco. Sprinkling the young plants with paris green injures them somewhat.

We keep our field perfectly clean of weeds all through the spring, leaving nothing for the newly hatched worms to eat, and about ten days before setting we make a mixture of 500 pounds of damp wheat bran and 5 pounds of paris green and send a boy over the field to drop a pinch of this mixture every other step, where the tobacco rows are to be. The worms must live on this or nothing for the next ten days. There are 8,000 plants on an acre, and usually we have to reset only a few hundred of them. When the plant has once started to grow it becomes too tough for the worms to eat.

Aside from drought or excessive rain, hail is the chief danger to the growing crop. If tobacco is badly hail cut, it is nearly or quite ruined; and a smart pelting hail in a moment's time may quite destroy a crop which would otherwise have sold for $350.00 per acre.

Tobacco is cured in barns of the sort shown in the picture. The cure is a process of ripening and of fermentation, not simply a drying. Quick drying would leave the tobacco almost as green as when taken in.

The leaf ripens on the stalk, turns bright yellow at first and then brown, giving off a large amount of water, probably, also, carbonic acid and, possibly, other organic products. If these processes go on either too quickly or too slowly, the leaf is damaged. Curing time is an anxious time. If the weather is warm and 'muggy,' with much rain, the leaf gets an evil, ugly smell and then 'pole-burn' is likely to set in. This is a bacterial disease, which runs very rapidly when conditions are favorable. The leaf turns black, rots and falls to the ground. I have known a shed of fine tobacco to be ruined within 48 hours by this disease, the leaves all having fallen to the ground and being fit only for manure.

This can be wholly avoided if the barns are so arranged that they can be warmed and thus dried out slightly and the air changed. Our station is now making experiments in this direction, which have already given most encouraging results.

The tobacco farmer has been willing to put some measure of faith in the book farmer of the Agricultural Station and, I believe, has been well rewarded for it. Years ago, after talking with a farmer—not a tobacco grower—regarding some reasons for thorough tillage, he paused in his work and remarked meditatively: "Science consists largely in telling people things which they already know, in a language which they cannot understand!" This particular kind of science is nowhere popular in the State, but in the selection of fertilizers the best tobacco growers depend largely upon the results of chemical examination and are willing to contribute of their own money to experiments which promise to make the curing of the leaf a less hazardous undertaking.

The barn-cured or pole-cured leaf is sold to the dealer, who finishes

its preparation for manufacture by fermentation in the case, which, by our present methods, takes from six to nine months.

If there were time, I should like to speak of the whims and fancies of smokers. One in particular I may touch upon. Within a year or two there has appeared a 'fad' for spotted wrappers. Many smokers of domestic cigars want a spotted cigar, like these which I have here. Why they want it no one can tell. The best Sumatra wrappers often have these spots, caused, it is thought, by a fungus, or by the burning of the leaf under a drop of rain or dew in a hot sun. But the best Sumatra is rather an evil-tasting thing, albeit its appearance on the cigar is attractive, and this with the majority of smokers counts for more than flavor. However, this demand for spots must be met. So last year a great deal of tobacco was artificially spotted by spraying in the field with chemicals, and thus, with the assistance of caustic soda and a squirt gun, choice Sumatra can be brought within the reach of the humblest citizen of the State.

There will be many spotted cigars on the market within the next year, and the rankest leaves, those at the top of the plant, are most effectually spotted and will be utilized for wrappers, though, unspotted, they are worthless for this purpose. They will make a cigar which may take the eye of the smoker, but with a flavor which would drive a dog out of a tan yard.

We call this particular kind of a cigar a Cabbagero rusticana. "It is like hell in the very substance of it," said the Defender of the Faith, "for it is a stinking, loathsome thing."

Mr. Burden: I would like to ask the gentleman what is the average profit per acre of growing tobacco in Connecticut?

Dr. Jenkins: It is impossible to say, because tobacco varies so in price.

Mr. Burden: I mean the average.

Dr. Jenkins: That is also impossible to say. I have heard growers claim that they could make ends meet if they got 10 cents a pound for their leaf. This year, some of them are getting 20 cents and the dealers who buy it are getting stuck. But many of them are selling their leaf for 4 cents and 5 cents a pound. Then the tariff and other things come in to make a difference. I do not know that I can answer that question. I know of one man who, fifteen years ago, came to Connecticut without a cent in the world and worked a year for $1.50 a day. He then borrowed $200 and bought some land and went into the business of tobacco raising for himself. The first year he lost $300. The lender of the money was willing to loan him more money without any security, and this man continued in the business and has since been successful. He now owns twelve or fifteen acres of probably the best tobacco land in the State, well equipped, with a barn and a house with all the modern conveniences. He told me last year that after paying all expenses of

raising his crop he had $2,000 to show for the work he put into it. He went into the field and worked with his men. But his is a very rare case.

Mr. Burden: Why can you not grow tobacco on sandy soil in this State?

Dr. Jenkins: A good deal is grown on sandy soil in New York. Professor Whitney could answer that question better than I. I do not suppose you could grow it near the Great Lakes or near salt water.

Mr. Burden: Could it be grown nearer Vermont?

Dr. Jenkins: That is a little too high a latitude for it, I think. There is a little tobacco raised in Vermont, but it is of inferior quality. Massachusetts is rather the northern limit on the eastern coast for a profitable growth of tobacco.

Commodore Gerry: Is there anything in the way of absorption of paris green, which is used on the soil, which is injurious at all to the plant?

Dr. Jenkins: No, we trust that the paris green is absorbed by the bug and not by the leaf. Paris green is sometimes used on the leaf itself. I do not think there would be any danger from that source. There would be only two or three leaves on the plant at the time when it is applied; and, at any rate, those leaves would be the very bottom leaves, which would be rejected and never used in the cigar—*sand* leaves, we call them, which are utterly worthless.

Commodore Gerry: I asked the question because that point might be used as a very serious argument against the use of tobacco from Kentucky.

Mr. Burden: How about potatoes?

Dr. Jenkins: The potatoes are under the soil, and you do not eat the top part of the plant.

Mr. Dodge: How expensive an operation is the heating of a tobacco barn?

Dr. Jenkins: I cannot say that.

Mr. Dodge: Do you use steam heat?

Dr. Jenkins: If anyone had a large number of tobacco barns together, it would unquestionably pay to put in steam. Most of them are scattered about, and a very cheap heating apparatus is the only kind that would be practicable. We hope to put in a heating apparatus that will not cost more than two or three hundred dollars. Of course, as you increase the size of the barn, the proportionate cost of the heat would be less.

Mr. Dodge: Is it a stove that you have in mind?

Dr. Jenkins: Yes, we are going to use a stove and hot-air flues; but only because steam would cost $400, and that would be beyond the means of the farmer. If a couple of barns were built together, steam would be much more economical and effectual.

Mr. Appleton: Among the gentlemen who were invited to be our

guests, and who know all about the tobacco plant, Mr. J. B. Keach, of East Windsor, Connecticut, was unable to attend, after his invitation had been accepted. He sent us a written statement, which is not very lengthy, and with your permission I will ask the Secretary to read it. It is to be remembered, I will say, that a great part of the value of the addresses which are made to us comes from the distribution all over the country of our printed reports; first, through the agricultural experiment stations in the different States, but chiefly through the local libraries scattered over the country, the distribution being left, under your direction, to the intelligent selection of our Secretary; so that the value of what a few of us listen to here is not confined to ourselves but becomes of very great importance.

The Secretary then read the paper prepared by Mr. Keach, which is as follows:

EAST WINDSOR HILL, CONN.

D. F. APPLETON, ESQ., Feb. 8, 1898.
President New York Farmers' Club.

DEAR SIR:

I am in receipt of your esteemed favor of the 5th inst., and most sincerely regret that I must decline your invitation to be the guest of the New York Farmers at the Metropolitan Club dinner, and to subsequently make an address upon the subject suggested. I thank you for the honor.

The Tobacco Plant is peculiar. Its place in modern agriculture is unique. It is a poisonous weed, without food value for man or beast. Those opposed to the use of tobacco have exhausted the resources of language in its condemnation. Yet the fact is apparent to all that its consumption is larger than ever, and that tobacco is of no small consequence in the commercial world. Regarded as both a necessity and a luxury by rich and poor, tobacco is constantly and aggressively pushing its way to a more and more conspicuous rank among staple agricultural products.

Farmers interested in raising tobacco should understand that nothing in agriculture more imperatively demands *good* culture than the tobacco plant. Soil culture should begin before plant culture—long before. Ground to be planted with tobacco next season should be put in good condition this season. Stable manure may be applied and the land plowed and thoroughly harrowed in the fall. It is an excellent plan to sow rye, just for a winter cover. A coverlet of green stuff growing on the tobacco field is as fitting as a coverlet of wool over one's bed. When turned under in the spring, its decay adds humus to the soil.

To properly fertilize ground for tobacco is a nice point. Well balanced fertilizers are as necessary for the tobacco plant as well balanced rations for domestic animals. Chlorine must be avoided. An excess of nitrogenous manures will be harmful. A due proportion of the phosphates is required, and a sufficient quantity of potash is indispensable.

It is of great importance that our fertilizers be applied in a form immediately available. A plant that makes its entire growth in from sixty to ninety days cannot wait for chemical transformations.

When the ground is prepared in the spring, it should be finely harrowed. A harrow is a good hobby for a tobacco farmer to ride. Perhaps a tobacco field was never yet harrowed too much. If the young tobacco plant is to thrive, its very slender and minute rootlets must not at the outset encounter difficulties.

The most painstaking labor on the farm may be bestowed upon the tobacco plant bed, and the care of the growing plants. The soil should be comminuted with the small, sharp teeth of a hand-rake, and stimulating fertilizers, fine as flour, worked in near the surface. Some farmers still use the open bed, with no protection save a covering of brush, and good plants are thus obtained in a favorable season. But the majority prefer to protect their beds with a covering of glass or cloth or a combination of both. In the climate of New York and New England it is not always easy to bring plants along to a suitable size as early in the season as they are wanted. Transplanting is now accomplished with rapidity by tobacco setters. Smaller and cheaper machines than any yet introduced, such as may be operated with a single horse, are needed by such farmers.

As soon as the preparatory soil culture ends, plant culture begins. Plants set out one day require attention the next day. Plants cut off by cutworms must be at once replaced, to insure an even stand. Assiduous cultivation through all the stages of early growth is essential. Tobacco is one of the most exacting of plants, and will not bear neglect. But all cultivation should be shallow rather than deep.

During its short life, the tobacco plant is liable to injury from fleas, worms, grasshoppers, and the mysterious calico disease, as well as other maladies. In New England the fear of early frost often induces farmers to harvest their tobacco before it is fully matured. But damages from drought, excess of rain, gales, hail and frost are all to be risked by tobacco farmers.

It is not an easy thing to grow a good crop of tobacco, but it is often easier than to take care of it after it is grown. The always to be dreaded pole-sweat may attack it in the sheds. A good crop without a good cure amounts to little.

It may also be said that a good crop without a good sale amounts to little. In the Southern States tobacco is sold under a system. In New England there is no system. Tobacco growers are at the mercy of tobacco buyers.

One mistake of our growers is in failing to unite and insist upon some policy more favorable to their interests. Another is in planting year after year the same varieties, largely from home-grown seed, and making little or no effort toward improvement. Years ago the tobacco

grown in Connecticut bore the suggestive name of shoe-string tobacco. Then new and better varieties were introduced, mainly by the enterprise of a few individuals. For years the growers have planted these same varieties as if they were the best in the world and no further improvement were possible. They lament because Sumatran and Mexican tobaccoes displace and depreciate their own product, in spite of tariff duties. Why do they not obtain seed of superior foreign varieties, acclimatize the plants, hybridize them with their own and other kinds, and strive to obtain the perfect tobacco plant, to compete with the world?

I live in a section of Connecticut where nearly every farmer raises tobacco. A large amount of capital, in the aggregate, is invested in tobacco barns and the necessities of tobacco farming. These farmers have obvious inducements to continue in the business.

But I can hardly advise a young man, just beginning life, to engage in tobacco culture in New England. For a number of years the production of tobacco here has been a struggle, in which few conspicuous successes have been recorded, while many have failed to obtain even a reasonable return for their labor and outlay. I am not speaking of things as they ought to be, but as they are. A considerable outlay is unavoidable. The fertilizers applied cost on an average probably not less than $60 an acre, and often more. These expensive applications must be made every year. Because of such constant fertilization it is possible to grow tobacco continuously on the same ground, and farmers have accepted the notion that tobacco does best planted in that way. The general rule that rotation is beneficial applies to tobacco as well as to other crops.

The cost of labor in the production of tobacco is formidable. There is the labor of preparing the seed-bed, its planting, watering, weeding and protection, the preparatory labor of the field, transplanting, cultivation, worming, topping, suckering, harvesting, hanging in the sheds, care of ventilating, taking down, stripping and, unless the crop is previously sold, assorting and casing.

Taking cost, labor and risks to be met, all into account, our farmers should get high prices for the weed—but they do not. At the present time there would seem to be numerous reasons why good tobacco should be well up in price—but it is not. If, with Cuban tobacco not to be considered, recent crops of Sumatra, small and inferior, a high protective duty, and an unusually small stock of good domestic leaf, New England tobacco must still go at moderate figures, what is the prospect for the future?

Foreign competition is not likely ever to be less, and it may be tremendously increased. But, leaving the foreigner to his own devices, the competition New England and New York tobacco growers should expect, and should prepare themselves to meet, is competition upon the soil of the United States.

While tobacco is even now grown to a greater or less extent in most of the states of the Union, there are immense sections of land in the South perfectly adapted to its production. Compared with these enormous areas, the tobacco lands of the North are but a bagatelle. Favored by a climate that permits two crops a year, the South is the place to look for the rapid development of the tobacco industry. Thence will come the competition against which protective tariffs will be out of the question.

Good tobacco can be and is produced in New England and New York. But there is no salvation for those of our growers who continue to raise inferior tobacco, or even a leaf of medium quality. The only hopeful prospect that I can see is to use every means that experience can suggest, or science discover, to produce what shall be recognized the world over as the perfect Tobacco Plant.

Yours truly,

J. B. KEACH.

Mr. Sturgis: Mr. President, it occurs to me to say, if you will permit it, that the subject of snuff has not been at all mentioned this evening; and one incident which occurred to myself might interest you for a moment. It was novel to me, and may possibly be so to some of the gentlemen present. Going west on the train a few years ago I met an ex-Confederate officer, who served in Virginia at the time I was in the service on the opposite side; and, on inquiring his business, I found that he was in the tobacco business at Norfolk. His name was Ropes; and he told me that the largest portion of the business of his firm, which was very large, was the manufacture of snuff for the French market, and that it was, as I understood him, the snuff which goes by the old name of Rappee, black snuff. He told me it was made, in the first place, by throwing into a hogshead in a damp, wet condition, the coarsest part of the stalk and the central portion of the leaves and fibres of the tobacco, and that in these hogsheads it was allowed to rot, absolutely to ferment and decay. Then, when decay had reached a certain point, probably just short of entirely destroying the material, they took it out, dried it, ground it, and shipped it abroad. He said they had an enormous trade in France, where, as you know, the tobacco business is a governmental monopoly, the entire profit growing out of it accruing to the French government.

A vote of thanks to the gentlemen who had addressed the meeting was then taken, after which the Farmers adjourned for the season.

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